

Proposal for Developing a Medical Physics Graduate Program (MPGP) at Duke Kunshan University (DKU)

	Page
Table of Contents	Page
I. Rationale and clarifications	2
I.a. What is medical physics?	2
I.b. What is the status of the field in the United States and globally	2
I.c. What is the Duke Graduate Program in Medical Physics	3
I.d. Why does China need a MPGP	3
I.e. Why should Duke help establish a MPGP at DKU	4
II. Relationship to existing programs at Duke and at other institutions	5
II.a. Overview of the proposed MPGP at DKU	5
II.b. Administration structure	6
II.c. The format of teaching	7
II.d. Financial model for DKU	8
III. Statement of resources needed for the program	8
III.a. Business plan	8
III.b. Review of resources available	11
III.c. Statement of additional resources needed	12
III.d. Potential or actual outside funding	14
III.e. Five-year student, faculty, and resource projections	14
III.f. Metric for evaluating the program's success	15
III.g. Challenges	15
IV. Students (sources, characteristics, opportunities available to graduates)	15
IV.a. Student sources	15
IV.b. Admission	16
IV.c. Professional tracks	16
IV.d. Career services and professional development	16
V. Degree requirements	17
V.a. The curriculum	17
VI. Descriptions of new courses and identification of teaching faculty	17
VII. CVs of faculty who will participate in the program	17
VIII. Statement of support from the Dean of the sponsoring school and any additional clearances obtained or required	19
IX. Student Learning Outcomes Assessment	19
IX.a. Program quality and impact	19
IX.b. Student learning outcome assessment	20
X. Appendices	21
Appendix A. Samples of Academic Plans	21
Appendix B: A job advertisement for DKU faculty search	23
Appendix C: Proposed courses and Durham faculty	24
Appendix D: Comments from ECGF and Responses	26
Appendix E: Comments from BSFSC and Responses	41
Appendix F: Comments from APC and Responses	47

I. Rationale and clarifications

I.a. What is medical physics?

Medical Physics, as defined by the American Association of Physicists in Medicine (www.aapm.org), is an applied branch of physics concerned with the application of the concepts and methods of physics to the diagnosis and treatment of human disease. Physics has contributed tremendously to the field of medicine over the past century by enabling the development of the medical disciplines of radiology, radiation oncology, and nuclear medicine. Today, medical physicists contribute to the healthcare enterprise in a number of ways. They improve the effectiveness of radiological imaging procedures by assuring radiation safety and helping to develop improved imaging techniques (e.g., mammography, CT, MR, ultrasound). They contribute to the development of therapeutic techniques (e.g., intensity modulated radiation therapy (IMRT), prostate seed implants, stereotactic radiosurgery), collaborate with radiation oncologists to design treatment plans, and monitor equipment and procedures to ensure that cancer patients receive the prescribed dose of radiation to the correct location. Furthermore, medical physicists contribute to the future of medicine by developing and optimizing procedures of the future such as functional imaging and molecular medicine. In the United States, medical physicists are concerned primarily with three areas of activity: clinical service and consultation, research and development, and teaching.

I.b. What is the status of the field in the United States and globally?

Medical physics has seen rapid growth as a profession since the 1990's in the USA. In addition to conducting academic research to advance medicine, medical physicists also participate in a variety of clinical activities. By current professional standards, medical physicists must receive training necessary to qualify them for clinical practice. The essential responsibility of the Qualified Medical Physicist's clinical practice is to assure the safe and effective delivery of radiation to achieve a diagnostic or therapeutic result as prescribed in patient care. The medical physicist performs or supervises the technical aspects of procedures necessary to achieve this objective. The responsibilities of the medical physicist include: the measurement and characterization of radiation; the determination of delivered dose; protection of the patient and others from potentially harmful or excessive radiation; establishment of adequate protocols to ensure accurate patient dosimetry; advancement of procedures necessary to ensure image quality; development and direction of quality assurance programs; and assistance to other health care professionals in optimizing the balance between the beneficial and deleterious effects of radiation; and compliance with applicable federal and state regulations.

The general path to becoming a medical physicist in the United States is by receiving the MS or PhD degree in medical physics, or alternatively, a graduate degree in physics or related fields with addition of post-graduate courses and training in medical physics. If a medical physicist intends to pursue a clinical career path, then a minimum of two-year residency training in clinical medical physics is also required. Clinical medical physicists typically seek certification by the American Board of Radiology (ABR) or equivalent

certification body in order to become qualified medical physicists (www.aapm.org). The job market for clinical PhD medical physicists includes both academic medical centers and community hospitals while the job market for clinical MS medical physicists is mainly in community hospitals. Both industry and government agencies also employ both MS and PhD medical physicists in which certifications may not be necessary. In terms of clinical services, both MS and PhD physicists perform similar types of responsibilities. There are currently 40 accredited graduate programs (<http://www.campep.org/campeplstgrad.asp>) in medical physics in the United States. In Europe, the education and training of medical physicists is being standardized across the EU nations (<http://www.sciencedirect.com/science/article/pii/S1120179711000925>). The demand for medical physicists across Asia is high but many of the standards and practices in Australasian countries are not consistent with those established in Europe and North America (<http://www.bijj.org/2008/1/e29/>).

I.c. What is the Duke Graduate Program in Medical Physics?

The Duke Medical Physics Graduate Program (MPPG) was established in 2004 and has since grown to be the second largest in the United States. It offers both MS and PhD degrees in medical physics. The Duke MPPG admitted its first group of graduate students in 2005, and received accreditation from the Commission on Accreditation of Medical Physics Educational Programs (CAMPEP) in 2008. As of September 2012, there are a total of 58 students enrolled, 34 in the master's degree program, and 24 in the PhD program. So far 86 have graduated with a master's degree and 13 with a PhD degree. The majority of our graduates work in the field of medical physics academically, in clinics, or in industry. There are over 50 faculty members in the MPPG, each having a primary faculty appointment in the Departments of Radiology, Radiation Oncology, Biomedical Engineering, Physics, or the Division of Radiation Safety. Moreover, Duke University also offers formal medical physics clinical residency training programs in both Radiation Oncology and Diagnostic Imaging. The residency training program in Radiation Oncology Physics is also accredited by CAMPEP. Details about the program are provided on the website (<http://medicalphysics.duke.edu/>).

I.d. Why does China need a MPPG?

As China and other countries in Asia start to adopt modern medicine associated with high-tech fields (e.g. radiation oncology, diagnostic imaging, nuclear medicine, bio-med engineering, and radiation protection and safety), investment in hardware (e.g. purchase of equipment and facility construction) has outpaced the training of needed professional staff. It is widely recognized that there is a severe shortage of qualified medical physicists in China. Some sample data are shown in the following two figures (figures courtesy of Dr. Li Yexiong, the current President of the Chinese Society of Radiation Oncology). Specifically, medical physics support in radiation oncology is only one-fourth of the standard recommended by the American Society of Radiation Oncology (ASTRO)/American College of Radiology (ACR)/American Association of Physicists in Medicine (AAPM). Moreover, there is no professional radiation physicist in the department of diagnostic radiology of almost all hospitals in China. Per brief conversation with Professor Hu Yimin, the President

of the Chinese Association of Medical Physics, there are only three medical physics graduate educational programs at present in China - all together with fewer than 30 graduate students, only a few of them are PhD candidates in medical physics. Although more graduate programs in Medical Physics are under planning, it will take time and effort to establish high quality medical physics training programs in China. Additionally, there is no organized and dedicated clinical medical physics residency training program. Nevertheless, it is expected that at least 1500 qualified medical physicists in radiation oncology will be needed by the end of year 2020 in China alone.

Radiation Equipment in China

Year	Linac	Co-60	X-ray	HDR	Dosi meter	Simulator	CT-Sim	TPS	γ -knife
2011	1296	286	81	317	1041	1040	378	1427	410
2006	918	472	146	400	796	827	214	851	149
2001	542	454	171	379	517	577	5	381	77
1997	286	381	179	282	302	332	-	177	
1994	164	304	194	217	215	170	-	75	
1986	71	224	239	78	180	100	-	45	

Employees of Radiation Centers in China

Years	Radiation Oncologist	Radiation Physicist	Nurse	Radio-therapist	Engineer	Total
2011	9895	1887	11689	6103	1411	30985
2006	5247	1181	6864	4559	1141	18992
2001	5113	619	5002	3465	932	15131
1997	3440	423	3094	2245	730	9932
1994	2764	--	2361	2212	--	7337
1986	1715	180	1062	1410	312	4963

Some oncologists are doing chemotherapy and radiotherapy.

Note: "Radiation Physicist" in the figure includes both physicists (40%) and treatment planners or dosimetrists (60%).

I.e. Why should Duke help establish a MPPG at DKU?

Duke University has a well-established medical physics graduate program which includes a number of distinct elements that China's existing programs do not have: 1) multidisciplinary education with 4 different specialties; 2) well-established faculty body with expertise in both research and clinical activities; 3) high-level training program at the PhD level; 4) integrated and comprehensive classroom education and clinical practicum; and 5) experience with establishing clinical medical physics residency programs.

There are both higher level and practical justifications for the development of a Duke-style MPPG at DKU. A China-based graduate program in Medical Physics would:

- a. Uphold the Duke University commitment to civic and global engagement, specifically with regard to the mission to "cure disease, and promote health, through sophisticated medical research and thoughtful patient care."
- b. Promote and enhance the Duke brand of academic quality on a global scale.
- c. Train high quality (potential future leaders in the field) medical physicist candidates for China and other Asian and some European countries. It is our intention that the training at DKU be primarily oriented to serve the needs of Asia and the Pacific region, and other areas lacking strong medical physics training, rather than the North American job market.

- d. Promote the advancement of an important professional field in a part of the world where the need is great but the professional training does not match the need.
- e. Provide international teaching experience and research collaborations for Duke University medical physics faculty members.
- f. Create interchanges and advancement of best practices, especially in the academic aspects of the two programs.

II. Relationship to existing programs at Duke and at other institutions

II.a. Overview of the proposed MPPG at DKU

The DKU program is conceived of as having several phases in its development. Phase I will be the establishment of a MPPG program at DKU with focus on starting a 2-year MS degree program in 2014. During this phase, the top students from the MS degree program would be given the opportunity to apply for the PhD degree program at MPPG-Durham. The DKU program organization will adopt what we have established at Durham for the MS degree in Medical Physics, including student enrollment, curriculum, degree requirements, etc. Initially we will emphasize therapy physics and imaging physics as the academic tracks for enrolled students at DKU because these are the areas in major demand in those parts of the world. Samples of Academic Plans for these fields for the MS degree are listed in Appendix A. A co-mentorship mechanism will initially be adopted; i.e., each student research will have a co-mentor from the MPPG-Durham faculty pool. Students interested in the Health Physics track will have the option to pursue that while on the Durham campus during the second year of graduate studies. In Phase II, beginning in 2016 or 2017, we will propose starting a PhD degree program in Medical Physics at DKU based on successful implementation of the MS degree program and the need for a PhD degree program at DKU. This second phase is an important part of the overall plan at DKU because of high demand for such training in China at present and because the Durham faculty members expressed strong interest to provide the research mentorship for PhD students. At this time, however, we are requesting approval of just Phase I, i.e. the MS program.

Although the DKU academic training is primarily in China—the first two semesters of classes, the clinical practicum, and the final thesis write-up – additional elective courses will follow the guidelines and formats as adopted at the Duke-Durham program. Initially the admission process will be handled by the MPPG-Durham admission committee using the same established admission criteria as for Durham MPPG students. In order to maintain high quality of graduate education and course teaching, we will send faculty (70% equivalent FTE faculty per year) from the Duke-Durham campus to DKU to provide short-term teaching. We will also recruit two FTE faculty members at DKU through an international search (a job advertisement will be posted for international search and is attached in Appendix B). The proposed courses for therapy and imaging physics and corresponding coverage faculty are listed in Appendix C. The effort compensation and travel and living costs incurred to the Duke-Durham faculty will be covered by the DKU program. In addition, we also introduce an option for the DKU students to do one semester of research (and/or courses) on the Duke-

Durham campus. This third semester of the four-semester program could also be accomplished in China, if the facilities and the mentorship are available. The Duke-Durham semester will probably be phased out in later years of the program as the hospital connections and research mentorship possibilities in China are expanded. The travel cost for students to undertake this optional Durham semester will individually be arranged by each student with administrative support from the program (see Budget Narrative below).

At beginning, all academic affair related to MPGP-DKU will be managed by MPGP-Durham based on academic criteria developed here. This is one of the essential reasons that the Director of the MPGP-DKU (equivalent to 30% effort of a regular faculty) will initially reside in Durham and should be one of core members of the Durham program both academically and clinically. However, our long-term goal is that the MPGP-DKU can run a high-quality graduate program with resources located at DKU, including teaching, clinical practicum, research, administration, etc. As such, the DKU faculty selection will be based on criteria as used at Duke University Durham and extensive exchanges of knowledge/experience between the two campuses will be highly encouraged, including exchange of teaching experiences and collaboration on research, etc.

The MPGP-DKU is a parallel program to the MPGP-Durham program in some aspects of curricular structure. However, it is designed to train a different cohort of students (Chinese and other international students) for professional work outside of the US. The DKU program is **not** equivalent to increasing the size of the Duke-Durham program. Furthermore, we do not anticipate that the current balance between the number of new US practitioners and the number of new jobs available each year would be disrupted by an increase in the size of the MPGP-DKU cohort because we anticipate that the majority of the DKU graduates will not seek employment in the U.S. (partially because there are strict requirements to get into a certified clinical training program in US). This DKU effort would thus not be a disservice to the Duke-Durham program.

II.b. Administration structure

The administration of the program at DKU will use the model of the MPGP-Durham as the template and incorporate local elements as needed. Many details of the local adaptations will have to wait for continued development of rules and guidance from DKU.

The MPGP-DKU program will be academically overseen by the MPGP-Durham program, and administratively and financially overseen jointly by both the DKU administration and MPGP-Durham. However, details of this arrangement will need to be decided by the Duke Provost office. The Director of MPGP-DKU will provide Duke-Durham, DKU, MPGP-Durham Medical Physics Administrative Council (MPAC) an annual report for review.

The MPGP-DKU will have an executive committee consisting of the Director of MPGP-DKU, an Associate Director of MPGP-DKU (also serving as Director of Graduate Studies [DGS] of MPGP-DKU), and DKU administrative assistant staff (two members). The Director will be responsible for the overall operation of the program and will spend the

equivalent of 30% of regular faculty effort in support of the DKU program. It is anticipated that at least initially the Director of DKU-MPPG will work between Durham and DKU campuses throughout the year. The Associate Director will be onsite at DKU overseeing daily operation of the program. The DKU administrative staff will be local and onsite at DKU full time. The executive committee is responsible for academic oversight and quality. The program Director of MPPG-DKU should be a member of the Durham MPAC as well as a faculty member of the MPPG-Durham program, and will be expected to work closely with the Durham program Director and MPAC to maintain the quality and standards adopted at MPPG-Durham. The two full-time administrative assistant staff at DKU will assist in coordinating the teaching and research activities. If there are any substantive changes to the overall nature or structure of the DKU program, including for example issues related to seeking accreditation, those decisions must be approved by the Duke-Durham MPAC. The MPPG-DKU program will be carefully reviewed and evaluated every year by the MPAC-Durham to determine if it meets the quality standards of Duke University based on the following metrics:

- Number and quality of applicants (e.g., entry GRE scores)
- Selectivity and yield rates
- Overall grades of the matriculated students
- Graduation rates and job placements
- Financial performance
- Teaching effectiveness per student evaluation
- Clinical training
- Student exchange information between the two campuses
- Qualifying exam performance

The MPPG-DKU will have a Quality Control Committee composed of the DKU program Director, 1-2 Durham MPAC members, at least one faculty member locally hired by DKU, and a representative of the DKU administrative staff. To widen feedback and input to the program, other DKU faculty members and student representatives in the MPPG-DKU may be added to this committee, but only as non-voting members. The function of this committee parallels that of the MPAC at Duke Durham. All major decisions and initiatives of the program at DKU, such as curriculum changes, seeking international accreditation, and assessing qualifications of teaching faculty, will be decided by this committee in concurrence with the Duke-Durham MPAC. This committee will also consider balancing the mutual interests, needs, and impact between both the DKU and Durham programs.

II.c. The format of teaching

Teaching at DKU will be based on the mixed models of in-classroom didactic, practicum, field work, and thesis work that have been developed for the MPPG-Durham. The didactic portion will be provided by 1) faculty at Durham traveling to DKU, 2) faculty at Durham via remote learning tools (mainly for one-credit seminar course and some invited talks), and/or 3) by local hired DKU faculty or adjunct faculty. A typical 3 credit hour course involves about 32 total teaching hours per semester with 75 minute lecture twice a week.

The course teaching schedule will be flexible. Sometimes, one course may be completed in a 7 week block when MPPG-Durham faculty is on site. All faculty members at DKU will be Duke Faculty or be appointed by the Duke Graduate School at least initially until DKU is ready to appoint its own faculty members. All courses will be taught in English. Courses may be taught in 7 or 14 week blocks, depending on overall scheduling needs. In order to enhance student learning and flexibility, faculty who teach in the DKU program will have the opportunity to make use of innovative educational approaches. For example, one or two core courses could be offered in a blended learning environment (part online, part classroom-based); team-based learning strategies could be employed; and live videoconferencing of experts from all over the world could enhance the learning experience for students. All lecture notes will be available on-line so that students can take notes on them individually and review them after a lecture has been given (we could, for example, use Sakai [or its equivalent] for the registered DKU students, as we do with Durham students today).

II.d. Financial model for DKU

The MPPG-DKU will be part of the financial structure of DKU, an independent legal entity in China. DKU will collect tuition revenue and other student fees and pay related expenses, including payments to Duke for teaching services. The MPPG-Durham and any associated departments at Duke Durham campus bears no financial risk for the program, but program leaders will help develop annual budgets which will be subject to both Duke University and DKU budgetary approval. We expect the direct cost of the MPPG-DKU to be covered by tuition revenue; as the program becomes established and successful it will be expected to contribute to the costs of space, academic support services, and administrative overhead at DKU. The Provost supports creating a program investment fund based on 20% of the “surplus” generated by the program, i.e. tuition income minus direct expense, which will be used only for MPPG-DKU program development. The establishment of a future PhD portion of the DKU program will be entirely dependent on external funding, either from the Chinese government or from international research/educational grants, or self-payment by PhD students. The MPPG-DKU will plan to apply for educational grants from Chinese government agencies, organizations, foundations, vendors, and any other resources to support education activities (see Budget Narrative below for more details). However, DKU will adopt the tuition waiver scholarship model for students in the PhD program similar to that used for the MPPG-Durham.

III. Statement of resources needed for the program

III.a. Business plan

A detailed budget plan is attached. This financial model has been developed in consistent with other program models in the DKU business plan developed by the Provost’s Office. James Dobbins and Fang-Fang Yin provided substantial input into the model based on data currently available from MPPG-Durham, taking into account special considerations for the DKU campus. The expectation for finances is to achieve a balanced budget between tuition income and direct program expenses (excluding space costs, academic support costs, and general administrative costs) within the first four to five years. The current financial model is

attached in a separate file. The MPPG-DKU budget is based on the model for the MPPG-Durham in terms of its structure and also the dollar figures associated with items such as salaries, benefits, tuition, and fixed and variable costs. The MPPG-Durham model has proved to be efficient and reliable, although some MPPG-DKU figures may have to be adjusted during Phase I of its operation. Salient points of the budget for MPPG-DKU include the following:

a. As budgeted, the program achieves a “steady state” by Year 4

Year 4 (AY 2016-2017) is projected to be the “steady state” in terms of when revenues and expenditures reach the level necessary to matriculate 20 new students per year. During the first year (2013-2014) there will be faculty hires before the first group of tuition-paying students has arrived. During the second year (2014-2015) there will only be one year’s worth of incoming tuition-paying students rather than the full complement of two cohorts. After year 4 and for all subsequent years, the program’s tuition revenues are projected to cover all direct program expenditures and may also create a positive “contribution margin” to help cover DKU facilities, academic support and general administrative costs. Note that these figures only apply to the Master’s Degree portion of the program. The Ph.D. program [if offered] will be dependent on outside funding from government and foundation sources and student self-paid tuition with the understanding that tuition waiver scholarship model for PhD students used in the MPPG-Durham will be adopted by MPPG-DKU.

b. Salaries and benefits of program personnel represent approximately half of program expenditures

As modeled, budgeted salaries and benefits will constitute approximately 47% of total budgeted expenditures. This is considered a reasonable percentage for a variety of academic and non-academic programs. Dollar figures are considered tentative at this point, but a rough estimate of \$565,000 should cover program-related salaries and benefits, with a significant portion of this amount flowing back to Duke in Durham to cover Duke faculty time.

c. The model for staffing the program follows that of the Duke program in most aspects

The people who will be hired for the DKU program are: (1) An equivalent of 1.0 FTE faculty based at MPPG-Durham to perform administrative and teaching tasks as well as to travel to DKU for short term teaching, (2) A full-time faculty member based at DKU to teach 2-4 courses per semester plus some administrative and academic responsibilities to be assigned by the program Director; (3) A full-time Associate Director based at DKU who will teach 2 courses per semester and also handle administrative duties; (4) A full-time program coordinator based at DKU to manage student academic activities; and (5) A full-time administrative assistant based at DKU. All MPPG-DKU personnel will report to the Associate Director, who will work closely with other DKU staff and report to the Durham-based DKU program Director. The DKU program Director, who will initially be

based in Durham but with frequent travel to DKU, will be considered (and paid) the equivalent of 30% effort (depending on individual faculty appointed) from DKU to undertake these administrative functions. The DKU contribution to the Director position will be considered as equivalent to 30% of 1 full-time regular faculty position. DKU will also fund Durham-based faculty equivalent to 70% effort of a full-time regular faculty position to teach at DKU on a course-by-course basis. This arrangement allows flexibility in staffing at DKU, gives MPPG-Durham faculty members the opportunity to teach a semester in China, and allows interaction between Durham and DKU peer faculty.

d. Tuition is based on the Duke tuition rate, with substantial tuition aid for PRC students

An annual gross tuition level of approximately \$45,000 is proposed, based on the MPPG-Durham. It is anticipated that People's Republic of China (PRC) students, on average, would be given a tuition aid discount (of approximately 30%) to bring their annual tuition to \$31,500 net annual tuition per PRC student. Other international students would potentially be given a minimum of 10% tuition aid discount. DKU's pricing and scholarship strategy must be approved by Chinese authorities. Final pricing will not affect Duke and DKU's commitment to invest the resources necessary to create and sustain a quality program at the levels envisioned in the business plan.

e. Students will have the option to live on campus and pay subsidized rates for lodging and meals

Students would pay their own housing costs and campus meal plan. Housing costs and meal costs are subsidized within the DKU financial model. Students will have the option to stay either on campus or off campus.

f. Fixed and variable program costs represent a combination of expenditures based on the experience of the MPPG-Durham, in addition to costs associated with the research semester (mentorship stipends, travel, etc.)

Fixed program costs include some DKU administrative overhead, orientation and social events, funds to bring in speakers, job fair, and a graduation ceremony (2nd year students only). Variable program costs include research support and travel allowance for second year students (during the research semester, whether it is at Duke or in China) plus stipends for the mentors of the second year students.

g. Actual student enrollment and tuition determination by the Jiangsu Provincial Pricing Bureau may affect the details of the budget

The two major sources of uncertainty in the financial model are student enrollment and the upcoming determination by the Jiangsu Provincial Pricing Bureau about the allowable level of tuition. In the first case, the projection is to admit 15 Master's Degree students each year for the first three years that the program is offered, increasing to 18 and 20 students in years 4 and 5, respectively. If applications from highly-qualified students are

below expectations, recruiting efforts will be expanded and strengthened. The decision on what tuition the DKU program can expect may not be known for some time. Duke and DKU administrators are currently in discussions with the Jiangsu Provincial Pricing Bureau to establish mutually agreeable pricing targets.

h. The operation of the MPPG-DKU potentially has many benefits for Duke University and very few negative aspects

Overall, the MPPG-DKU program presents minimal but manageable negative impact on the MPPG-Durham, such as an additional (but limited) commitment of time by some of Duke faculty members when a subset of the DKU students are on the Duke campus during their 3rd semester. On the other hand, the MPPG-Durham would be positively affected by the DKU program because of the mentorship stipend paid to Duke faculty members for guiding DKU student research, the “arm’s-length transaction” whereby Duke sends DKU an invoice for services associated with Duke faculty time devoted to teaching and administering the program, the training of the most talented DKU students for potential entry into Ph.D. programs at MPPG-Durham and/or MPPG-DKU, and the opportunity for Duke faculty members to teach and enter into productive collaborations in China under managed and facilitated conditions.

III.b. Review of resources available

Classroom: The DKU campus will be available for classroom teaching by the year of 2014. High-speed internet and VPN connection to Duke University at Durham will be also available.

Program model: MPPG-Durham has 8 years of experience in teaching medical physics both at MS and PhD levels as well as mentoring thesis research for graduate students at both levels. The lessons from these years will be applied to the MPPG-DKU. The financial model of the MPPG-Durham has been very successful and is considered stable into the foreseeable future.

Faculty availability: In addition to MPPG-DKU faculty members, three other different categories of faculty may teach at DKU: Duke faculty members based in Durham who travel to DKU to teach specific courses; adjunct faculty from China and other parts of the world, and Duke faculty members who reside full-time in Durham and teach by distance learning (mainly for the one-credit seminar course or a few invited lectures). Initially all faculty teaching in the program will have Duke faculty appointments. The DKU faculty will be recruited internationally by the MPPG-Durham leadership, Duke Leadership, and DKU Leadership (a draft advertisement is attached in Appendix B). All Adjunct Faculty will be reviewed and appointed following the same criteria as used at MPPG-Durham. While we can’t dictate to Duke faculty whether and how they share teaching resources they’ve developed, we will encourage sharing of resources to others teaching the same classes at DKU. We will also establish faculty exchanges between Durham and DKU.

Student pool and experience at MPGP-Durham: Although MPGP-Durham has a substantial foreign student presence (between 25-35%, mainly from China), we do not anticipate this number will be substantially changed given the large pool (estimated about 100,000 potentially qualified applicants) of undergraduate students in China. We further expect that the graduate students at MPGP-Durham program will positively contribute to the growth or maturity of the MPGP-DKU. We have polled MPGP-Durham students with two questions 1) Do you view MPGP-DKU as a positive initiative? And 2) Would you be interested in assisting the program? A large number of students at MPGP-Durham responded as being very supportive of the MPGP-DKU program initiative and expressed willingness to contribute to the program development. A student network will be established to facilitate communication between the two student bodies through advanced internet facilities and functionalities between the two campuses.

Clinical training site in China: There are a large number of hospitals with up-to-date technologies in China, which can be potentially used as clinical practicum sites. It is an important early task to identify the specific hospitals in China to be formally used as the practicum training facility for the students. Section III.c. discusses more details for more information on potential partners.

III.c. Statement of additional resources needed

Staff requirements: The MPGP-DKU will be staffed with a Program Director to oversee the direction of the MPGP-DKU and as a liaison to the MPGP-Durham. Initially, the DKU Director will be based in Durham to facilitate inter-institutional interaction and to ensure overall program quality, but will travel to DKU regularly. The Director will be proposed by MPGP-DKU steering committee and approved by MPAC MPGP-Durham. This director should also be a member of MPAC-Durham for better integration. The program will have an Associate Director who will be resident at DKU and will also serve as the Director of Graduate Studies (DGS-DKU) for MPGP to oversee the teaching activities. Other DKU staff not specifically affiliated with MPGP will be available to support the MPGP-DKU team. The person in the position of Associate Director and DGS will devote 100% effort at DKU (40% administration and 60% teaching). The program will also employ two Administrative staff both 100% at DKU, to take care of administrative issues for MPGP-DKU. Details about the administrative duties will be discussed with administrators from DU and DKU.

Need of practicum sites at local affiliated hospitals: Several hospitals in the local areas of Shanghai, Jiangsu, and Zhejiang provinces and neighboring cities will be able to offer practicum classes to MPGP-DKU students in the radiation therapy, imaging, health physics, and nuclear medicine tracks. Some hospitals in Beijing have also expressed interest. Zhongnan Hospital affiliated with the partner Wuhan University is another option. Beijing and Wuhan are both at a considerable distance. However, with the availability of high speed trains and airplane flights, this option may be manageable for some selected students, e.g., students with family in Wuhan or Beijing areas. We anticipate reaching an agreement with at least three hospitals as designated practicum sites for MPGP-DKU before the opening of the MPGP-DKU program with designated hospital staff to serve as the liaisons for the practicum. Some may be compensated by stipends and some by offering additional training for them at

Duke, such as visiting scholars, etc. We may also consider a student practicum option where they opt to stay one semester at MPGP-Durham if there is no conflict with training schedules of Durham students.

Some potential university/academic hospitals in China that may be selected as practicum sites and potential student research collaborators have been contacted initially and expressed strong interest in participating in the MPGP-DKU educational mission. Examples of potential clinical sites and hosts include:

Zhejiang University Hospital
Deyu Chen (Professor, Radiation Oncologist and Vice President)

Zhejiang Cancer Hospital
Ming Chen, MD, PhD (Professor, Radiation Oncologist, Vice President)
Xiaoyun Di, MS (Professor and Chief Physicist)

Cancer Hospital of Fudan University
Photon, electron, carbon and proton facility
Guo-liang Jinag, MD (Professor, Radiation Oncologist and past President)
Zhen Zhang, MD (Professor and Chair)
Zhiyong Xu, PhD (Chief physicist)
Weigang Hu, MS (Chief Physicist)

Shandong Cancer Hospital
Jinming Yu, MD PhD (Professor, Radiation Oncologist, President)
Yong Yin, PhD (Professor and Chief Physicist)

Zhejiang University First Affiliated Hospital
Shenxian Yan, MD PhD (Radiation Oncologist, Professor and Chair)
XX (Director of PET facility, Professor and Radiologist)

Beijing University
Guangying Zhu, MD PhD (Professor, Radiation Oncologist, Chair)
Hao Wu, MS (Chief Physicist)

Chinese Academy of Medical Sciences, Cancer Hospital
Yexiong Li, MD (Professor and Chair, Radiation Oncologist)
Yiming Hu (Professor, President of Chinese Society of Medical Physics)
Jianrong Dai, PhD (Professor and Chief Physicist)

Those hospitals are some of leading institutions in China and have state-of-the-art advanced treatment modalities such as at leading sites throughout the world. Potentially, some of them could be used for students to do thesis work or conduct research projects as each student will be co-mentored by one of MPGP-DKU faculty. For this reason, faculty in these institutions may be given an adjunct faculty appointment as judged by the Duke Faculty appointment

requirements. Such appointments will initially be recommended and reviewed by the MPAC at MPGP-Durham.

The practicum courses could be done during the week or concentrated in weekend arrangements in affiliated hospitals. Our faculty and associates in affiliated hospitals will serve as the instructors for these practicum courses. We will train some of the physicists/physicians at Duke to provide practicum support for our students. We have been doing this for many years prior to DKU.

Option for students to study at MPGP-Durham: Students in the MS degree program will be allowed to study and take courses at the Duke-Durham campus between the end of the first academic year (June 1) to the end of the first semester of the second year (December 20). During this period of time, students will select research topics with Durham faculty, conduct research, take qualifying exams, and also take courses during the Fall semester. As discussed before, each research thesis topic will at least have a co-mentor faculty from MPGP-DKU.

Student network between Durham and DKU: We will establish a student communication channel via internet (Duke's student group discussion software, social media, etc.) between MPGP-Durham and MPGP-DKU so that students from both sides will be able to interact effectively. In addition, student exchange programs will be established.

III.d. Potential or actual outside funding

We will be seeking research and educational funds from government, organizations, and industry following the policies and guidelines of DKU. Details on how to implement these activities are still being developed and it is unclear how successful this will be. Collaboration between different local institutions will also be explored.

III.e. Five-year student, faculty, and resource projections

Application and enrollment processes are being developed for DKU programs. Application review and decision making will reside with MPGP program staff, with formal approval by the DU Provost and the DKU Executive Vice Chancellor. In this way we will be able to ensure equivalence in the education quality and standard between the programs at Durham and DKU. However, we do recognize that the student applicant pool may be different than here at MPGP-Durham and selection criterion thresholds may therefore differ slightly. Our current vision for the program size is also similar to the MPGP-Durham: about 15 MS degree candidate enrollment per year initially. The MPGP-DKU is conceived as having several phases in its development. Phase I is the establishment of the MPGP-DKU MS degree program. The graduating MS students may apply as PhD students at MPGP-Durham program. We anticipate that about 2-3 years later, we will propose a PhD program in medical physics for MPGP-DKU as phase II of development, when enough experience has been accumulated for MPGP at DKU and the conditions for a PhD program are ready.

1 st year Students	2014	2015	2016	2017	2018
-------------------------------	------	------	------	------	------

MS	15	15	15	18	20
PhD Durham Candidates	0	0	1-2	1-2	1-2
PhD DKU Candidates	0	0	0	0-5	2-5

III.f. Metric for evaluating the program's success

One critical measure of the success of this proposal will be the implementation of the medical physics graduate program at DKU in 2014 by enrolling about 15 graduate students. Successful implementation will include 1) Developing infrastructure for the program; 2) Developing curriculum for the MPGP at DKU; 3) Organizing application and admission process; 4) Developing collaboration with a few Chinese universities and hospitals, including Wuhan University; 5) Developing teaching/research infrastructure at DKU (organize potential courses, faculty, teaching format, instruction, program activities and administrations; 6) Developing and balancing the financial model; and 7) Exploring options for external financing to support educational/training/research activities in medical physics, etc. 8) recruiting and producing high quality graduate students.

III.g. Challenges

While the proposal is promising and seems feasible at DKU, a number of challenges exist, such as 1) Percentage enrollment of students between China and other countries (it is difficult to predict the ratio of Chinese to non-Chinese students and we would consider it acceptable to have 100% Chinese students); 2) Tuition scholarship rate for Master's degree graduate students; 3) Mentorship from MPGP-Durham; 4) Impact of MPGP-DKU program on the MPGP-Durham program such as potential student resources; 5) Student's stay at Duke-Durham, including health insurance, other expenses, mentorship capacity, visa application, etc.; 6) Logistics of faculty from Durham teaching at DKU; 7) Program management across the two countries (student pool, class sharing, financing, video teaching, faculty resources and effort, etc.); 8) Quality maintenance of practical training in China since there is no Duke associated hospitals in the area; and 9) Unforeseen government restrictions on both sides. However, we are optimistic that these issues will be properly managed or addressed if the Duke-Durham and DKU programs work closely together with the support of leadership from Duke University and DKU.

IV. Students (sources, characteristics, opportunities available to graduates)

IV.a. Student sources

The primary target students for these degrees will be from both Chinese and other international countries with a bachelor's or graduate degree in the field of physics, medical physics, and some related science and engineering fields. For students with an engineering background, there are specific educational requirements in medical physics as spelled out in the program of MPGP-Durham. The same admission requirement will be applied at DKU. Students must meet all Duke University admissions criteria. There will be a joint admissions committee comprised of MPGP-DKU and MPGP-Durham faculty.

IV.b. Admission

All applicants will be evaluated from multiple perspectives including academic capability, intellectual curiosity (as judged by reading the person's personal statement, recommendation letters, research experience, and talking with the person directly in an interview), accomplishments, leadership potential, and communication skills; etc. The process of admission will be similar to Duke, such as requirements of TOEFL, GRE, appropriate college courses, letters of recommendations, etc., but will also follow the specific guidelines set by DKU. The Duke admission committee will review all applicants in a similar manner as for Duke-Durham campus applicants and recommend students for admission based on similar criteria used at MPGP-DKU.

IV.c. Professional tracks

We will offer the same four similar academic tracks as currently at MPGP-Durham but at the beginning, we will emphasize the radiation therapy physics track, which is the major track demanded in China and other Asian countries, and the imaging physics track, which is also demanded by many vendors, imaging departments and research institutions. Core courses plus elective courses are defined for each track, including thesis requirements.

IV.d. Career services and professional development

The program will advise students on career development in local and international job markets by

- Providing career workshops and training sessions
- Helping students identify personal strengths and interests
- Offering one-on-one counseling to students to work out personalized short-term job search and long-term career development strategies.
- Providing assistance to find residency programs

We plan to invite hospital chiefs in radiation oncology and imaging as well as leaders from vendors to DKU for a job fair every year during the Spring semester.

Another option is to develop contractual relationship with some hospitals/vendors/institutions so that student fees will be paid by hospitals/vendors/institutions during the training but that individual student will have to commit his/her employments/services to the funding hospitals/vendors/institutions after graduation.

Students in the program will acquire the knowledge and some degree of clinical knowledge/experience they need to be trained as professional medical physicists in China and other countries with similarly constructed medical facilities. As is common with all graduate programs in medical physics in the U.S., the program only gives very limited clinical medical physics exposure. We strongly encourage that students who graduate from the program and wish to practice clinical medical physics should seek proper additional

training in clinical skills for patient care. This could be done either through a specially designed clinical medical physics training program such as a residency or on-job training program. The specific clinical practicum sites (to be developed as part of this proposal) may partially serve this purpose.

V. Degree requirements

V.a. The curriculum

Initially, the curriculum at MPGP-DKU will be the same as MPGP-Durham. A detailed list of curriculum components is available at the website of MPGP-Durham (medicalphysics.duke.edu). An example of a typical 40-credit course requirement is listed below for students in the radiation oncology physics track. More detailed curriculum plans are listed in the attached materials at the end of this proposal (Appendix A). However, this curriculum may need to be modified to fit DKU's special needs. In general, we will encourage curriculum be shared between MPGP-DKU and MPGP-Durham. Initially, the MS degree at MPGP-DKU will mainly be focused on therapy and imaging physics with majority in therapy physics since this is the major job demand in China.

Example for MS degree students in the Radiation Oncology Physics track:

- 6 core courses
 - MP 500 Radiation Physics (3 credits)
 - MP 505 Anatomy & Physiology for Medical Physics (3 credits)
 - MP 530 Modern Diagnostic Imaging Systems (3 credits)
 - MP 510 Radiation Protection (3 credits)
 - MP 520 Radiation Therapy Physics (3 credits)
 - MP 541 Nuclear Medicine Physics (3 credits)
- 1 track-specific course
 - MP 722 - Advanced Photon Beam Radiation Therapy (3 credits)
- 1 track-specific practicum and shadowing course
 - MP 728 Clinical Practicum (RT) (3 credits)
- 1 frontier course
 - MP 770 Frontiers of Biomedical Science (3 credits)
- 1 elective course
 - MP 723 Advanced Brachytherapy/Special Topics (3 credits)
- 4 1-credit seminar courses
 - MP 751 Seminars in Medical Physics (4 credits)
- A MS thesis or Scholarship project (6 credits). If the student selects to do a scholarship project, then 6 credits of coursework are substituted for 6 credits of research.

VI. Descriptions of new courses and identification of teaching faculty

No new courses will be introduced.

VII. CVs of faculty who will participate in the program

(only primary departmental affiliations are shown; many faculty also have secondary appointments in other departments)

Organization committee faculty

Nora Bynum, PhD, Vice Provost for Duke Kunshan University (DKU) and China Initiatives

James Dobbins, PhD, Associate Professor of Radiology, Biomedical Engineering, and Physics (Director, MPGP-Durham)

Titania Juang, [Medical Physics Graduate Student, MPGP-Durham](#)

Haijun Song, PhD, DABR, Assistant Professor of Radiation Oncology

Timothy Turkington, PhD, Associate professor of Radiology (DGS, MPGP-Durham)

Fang-Fang Yin, PhD, DABR, Committee Chair, Professor of Radiation Oncology (Associate Director, MPGP-Durham, Director, Radiation Oncology Physics Residency Program, Chief, Radiation Oncology Physics Division)

MPGP-Durham faculty who are interested in participating activities related to MPGP-DKU

1. Justus Adamson, PhD, DABR, Assistant Professor of Radiation Oncology
2. James Bowsher, PhD, Assistant Professor of Radiation Oncology
3. Jing Cai, PhD, DABR, Assistant Professor of Radiation Oncology
4. Zheng Chang, PhD, DABR, Assistant Professor of Radiation Oncology
5. Nan-Kuei Chen, PhD, Associate Professor of Radiology
6. Oana I. Craciunescu, PhD, DABR, Associate professor
7. Yunfeng Cui, PhD, Assistant Professor of Radiation Oncology
8. Shiva Das, PhD, DABR, Professor of Radiation Oncology
9. James Dobbins, PhD, Associate Professor of Radiology
10. Donald Frush, MD, Professor of Radiology
11. Anuj Kapadia, PhD, Assistant Professor of Radiology
12. Chunlei Liu, PhD, Assistant Professor of Radiology
13. Joseph Lo, PhD, Associate Professor of Radiology
14. James MacFall, PhD, Professor of Radiology
15. Mark Oldham, PhD, DABMP, Professor of Radiation Oncology
16. Lei Ren, PhD, DABR, Assistant Professor of Radiation Oncology
17. Ehsan Samei, PhD, DABR, Professor of Radiology
18. Haijun Song, PhD, DABR, Assistant Professor of Radiation Oncology
19. Paul Stauffer, MS, Professor of Radiation Oncology
20. Martin Tornai, PhD, Associate Professor of Radiology
21. Trong-Kha Truong, PhD, Assistant Professor of Radiology
22. Timothy Turkington, PhD, Associate professor of Radiology
23. Zhiheng Wang, PhD, DABR, DABMP, Associate Professor of Radiation Oncology
24. Jackie Wu, PhD, DABMP, Associate Professor of Radiation Oncology
25. Qiuwen Wu, PhD, DABR, Professor of Radiation Oncology
26. Hui Yan, PhD, Assistant Professor
27. Fang-Fang Yin, PhD, DABR, Professor of Radiation Oncology

Current MPGP-Durham students interested in the DKU initiative

1. Ergys Subashi (ergys.subashi@duke.edu)
2. Titania Juang (titania.juang@duke.edu)
3. Larry Cumberbatch (lcc15@duke.edu)
4. Taoran Li (taoran.li@duke.edu)
5. Anna Rodrigues (aer24@duke.edu)
6. Andrew Polemi (amp61@duke.edu)
7. Irina Vergalasoova (irina.vergalasoova@gmail.com)
8. Xiaolei Xu (xiaolei.xu@duke.edu)
9. You Zhang (zhangyounju@gmail.com)
10. Susu Yan (sy53@duke.edu)
11. Lynda Ikejimba (lci@duke.edu)
12. Marthony Robins (mlr46@duke.edu)
13. Baiyu Chen (baiyu.chen@duke.edu)
14. Drake Brookins (drake.brookins@gmail.com)
15. Chunhao Wang (cw204@duke.edu)
16. Siming Lu (sl270@duke.edu)
17. Adria Vidovic (akv7@duke.edu)
18. Yilin Liu (yl220@duke.edu)
19. Qijie Huang (huangqijie08@gmail.com)
20. Qiongge Li (ql40@duke.edu)
21. Xiao Liang (xliang90@gmail.com)
22. Scott Haile Robertson (scotthailerobertson@gmail.com)
23. Hao Li (hl85@duke.edu)
24. Yanan Cao (yc118@duke.edu)

VIII. Statement of support from the Dean of the sponsoring school and any additional clearances obtained or required

TBA

IX. Student Learning Outcomes Assessment

IX.a. Program quality and impact

Expectations for student knowledge and performance will be clearly stated so that all professors and students understand the goals of the program and the measurements used to evaluate students. Methods will also be devised to provide feedback to students, professors, and clinicians regarding which aspects of the academic and training experiences are successful (and why) as well as which aspects need to be modified. This process of strategic, adaptive modification could involve mid-course corrections (changes in procedure during a semester) or adjustments from one academic year to the next.

Learning objectives will be available in written form and aligned with outcomes and assignments both at the level of individual courses and also at the program level. The learning objectives will be categorized according to specific types of skills—for example,

knowledge and comprehension (“know the basic systems and the major characteristics of each”), application and analysis (“be able to explain the strengths and weaknesses of various systems” or “be able to compare at least two methods of analysis”), and synthesis and evaluation (“be able to synthesize your knowledge and apply it to a new problem”). Assignments will be matched to learning objectives appropriately such that basic knowledge is assessed through methods such as quizzes and worksheets whereas more synthetic activities will be conducted through group presentations or via term papers.

Attainment of learning objectives will be evaluated through the use of well-defined standards and rubrics. Examples of rubrics for term papers, oral presentations, laboratory reports, and other activities are widely available on-line and in the education literature. Tested and trusted rubrics will be adopted for use for specific Medical Physics projects. Brief trouble-shooting sessions to assure inter-rater reliability will be conducted in cases where several reviewers evaluate the same important projects (see below with comparison of Master’s Degree theses).

The major tangible outcome of the Medical Physics Master’s Degree is the thesis. This project involves independent research, working with a mentor, data collection, data analysis, and a final written document. The thesis is an exemplar of the two-year program and a capstone product. It is therefore fitting that it should receive particular attention in the program evaluation process. The application of a detailed rubric to the DKU thesis can answer one of the main questions regarding the effectiveness of this program:

“Does the MPPG-DKU attain the same high quality that is achieved in the MPPG-Durham?” or “Does the MPPG-DKU maintain the same quality and standards developed in the MPPG-Durham?”

Other questions that can be raised and answered include:

- 1) Within the group of Duke medical physics degree holders, do the ESL students have different scores from the English-language students in verbal expression? Quantitative skills? Experimental design skills?
- 2) Are DKU Chinese students writing theses with similar characteristics to the Chinese-speaking students in the Duke program?

IX.b. Student learning outcome assessment

The student learning outcome will be assessed following similar steps employed at the graduate school at Duke-Durham.

- a. *Course evaluations by students.* Courses offered at the MPPG-DKU will initially be reviewed by the Associate Director and DGS-DKU and/or the Director. Course titles, summaries, number of credits, are submitted to the registrar for approval and implementation. Students are required to complete evaluations at the end of each semester for each Medical Physics course. These course evaluations provide opportunities for simple quantitative feedback in many areas but also allow additional written comments for each

area of rating. Summaries of these anonymous evaluations are then shared with the teachers, and all summaries are sent to the DGS for review. Any major areas of concern are then addressed by the DGS-DKU in conversation with the instructor(s). In addition to the official course evaluations, students are routinely encouraged by the DGS to be in dialogue with teachers with both positive feedback for the courses and thoughts about potential areas of improvement.

- b. *Student Advisory Board (StAB)*. A small group (up to 6) of students is chosen by their peers to meet with the DGS on a monthly basis. One of the purposes of these meetings is to allow students to promote ideas and suggest improvements about classes, the curriculum, or the program in general. It also serves as an intimate forum for the DGS to propose and explain new ideas that are being considered.
- c. *Exit Interviews*. Each student has a mandatory meeting with the DGS before graduating. The DGS asks for feedback regarding the program in several different areas, one of which is the curriculum. Comments are summarized and shared with the curriculum committee. Students are asked to grade the program (a letter grade).
- d. *Meetings of Teachers*. All teaching faculty members will meet (or tele-conference) annually for 2-4 -hour sessions to evaluate detailed lecture topics, teaching and evaluation methods, and to identify areas of overlap as well as gaps.
- e. *The QC Committee (MPAC-DKU)*. Much of the higher-level discussion regarding curriculum is covered by the MPAC, both in regular monthly meetings and in the annual summer retreat. When changes to the curriculum are deemed appropriate, the DGS will carry out the appropriate actions, including potential teacher recruitment, with the assistance of the program staff.

Methods and technologies used for remote teaching and lecturing will be evaluated by both faculty and students at MPGP-DKU for its effectiveness and efficiency. Those evaluations will be documented and analyzed for immediate improvements if necessary.

X. Appendices

Appendix A. Samples of Academic Plans

The course will be organized by the DGS-DKU based on the protocols developed at MPGP-Durham. Below are sample academic plans for students in our program. We show two plans for MS students (in the therapy physics and imaging physics tracks). The primary variation that would occur for MS students is the choice of elective course and major track core course. Some students also chose a frontier course other than the one offered by the program.

For MS students, it is anticipated that some will participate in the MPGP-Durham program between June to December (7 months) right after the Spring semester of the first year, as describe in Section III.C Option for students to study at MPGP-Durham.

1st Year - All students take the 1st-year core curriculum. These courses are offered every year. All students enter in the fall.

1st-year Fall:

MP700 Radiation Physics (3 hr) - Durham/DKU faculty
MP705 Anatomy and Physiology (3 hr) - Durham/DKU faculty
MP730A Modern Diagnostic Imaging Systems (3 hr) Durham/DKU faculty
MP751 Seminars in Medical Physics (1 hr) – on-line teaching

1st-year Spring:

MP720 Radiation Therapy Physics (3 hr) – Durham/DKU faculty
MP710 Radiation Protection (3 hr) – Durham/DKU faculty
MP741 Nuclear Medicine Physics (3 hr) – Durham/DKU faculty
MP751 Seminars in Medical Physics (1 hr) – on-line teaching

MS 2nd year

Sample 1 – Sample sequence for Radiation Therapy track MS student

2nd-Year Fall

MP722 Advanced Photon Beam Radiation Therapy (3 hr) - Durham faculty
MP723 Advanced Brachytherapy and Special Topics (3 hr) - Durham faculty
MP728 Clinical Practicum (RT) (3 hr) - Durham/DKU faculty
MP751 Seminars in Medical Physics (1 hr) - on-line teaching
Thesis research credit (3 hr) - Durham/DKU faculty

2nd-Year Spring

MP770 Frontiers of Biomedical Science (3 hr)
MP728 Clinical Practicum (RT) (3 hr) – Durham/DKU faculty *and on-site faculty*
MP751 Seminars in Medical Physics (1 hr) – on-line teaching
Thesis research credit (3 hr) - Durham/DKU faculty

Sample 2 – Sample sequence for Imaging Physics track MS student

2nd-Year Fall

MP748 Clinical Practicum and Shadowing (NM) (3 hr) - Durham/DKU faculty *and on-site faculty (elective)*
MP723 Advanced Brachytherapy and Special Topics (3 hr) - Durham faculty (elective)
MP770 Frontiers of Biomedical Science (3 hr) – Durham/DKU faculty
MP751 Seminars in Medical Physics (1 hr) – on-line teaching
Thesis research credit (3 hr) – Durham/DKU faculty

2nd-Year Spring

MP748 Clinical Practicum (DI) (3 hr) - Durham/DKU faculty
MP731 Advanced Medical Imaging Physics (3 hr) – Durham/DKU faculty
MP751 Seminars in Medical Physics (1 hr) – on-line teaching
Thesis research credit (3 hr) - Durham/DKU faculty

Appendix B: A job advertisement for DKU faculty search

POSITION: Medical Physics Faculty Positions
LOCATION: Duke Kunshan University (DKU), China
Kunshan, China

DESCRIPTION:

Applicants are invited to apply for medical physics faculty positions in the Medical Physics Graduate Program at Duke Kunshan University (DKU). The primary responsibilities for these positions are to provide teaching, research, and administrative support for the newly formed Medical Physics Graduate Program. The first class of graduate students in master degree is expected to start in 2014.

Duke Kunshan University is a Sino-American partnership between Duke University (USA), the city of Kunshan (China), and Wuhan University (China) to create a world-class, liberal arts-style university in China. Duke Kunshan University will enroll outstanding students from all around the world who will contribute diverse perspectives and experiences to DKU's global learning environment. The university's rigorous academic programs will inspire students to master cutting-edge knowledge, generate new ideas, and develop creative solutions to the world's challenges, preparing them not just for careers in specific fields, but to become globally sophisticated citizens and leaders. Duke University in Durham, USA, is responsible for the academic offerings at DKU. Consistently ranked among the best universities in the world, Duke University is committed to applying knowledge in service to society, in the United States and around the world.

The minimal qualification for the positions is a PhD degree (or equivalent) in Medical Physics or a PhD degree (or equivalent) in closely related physical sciences with proper training in Medical Physics. The successful candidates for medical physics faculty positions will be required to teach 3-6 medical physics courses every year plus active involvement of supervising graduate student thesis research in the following medical physics sub-fields: radiation therapy physics, medical imaging physics, nuclear medicine physics, and radiation health physics. Preference will be given to individuals who have teaching, research, and clinical experiences in some of medical physics sub-fields. We are looking for highly motivated individuals to develop their professional career at DKU. Excellent communication skills in both Chinese and English are a plus. The medical physics faculty members at DKU will report to both DKU administration and Duke University Medical Physics Graduate Program and are also expected to work closely with faculty in the Medical Physics Graduate Program at Duke University. Proper faculty ranking may be appointed based on qualification.

Duke University Medical Center offers competitive wages and an excellent benefits package. An Affirmative Action/Equal Opportunity Employer. Please send your CV and references to:

CONTACT: XXXXXXXXXXXX

Appendix C: Proposed courses and Durham faculty

Course Title	Instructor	Date	Tentative assignment	Note
Year One common core courses Fall				
MP700 Radiation Physics (3 hr)	Durham/DKU faculty	Fall 2014	Qiuwen Wu/Anuj Kapadia/DKU faculty	1-3 weeks demo
MP705 Anatomy and Physiology (3 hr)	Durham/DKU faculty	Fall 2014	Robert Reiman/DKU faculty/adjunct faculty	1-3 weeks demo
MP730A Modern Diagnostic Imaging Systems (3 hr)	Durham/DKU faculty	Fall 2014	James MacFall/Joseph Lo/DKU Faculty	1-3 weeks demo
MP751 Seminars in Medical Physics (1 hr)	Online teaching	Fall 2014	Blended	
Year One common core courses Spring				
MP720 Radiation Therapy Physics (3 hr)	Durham/DKU faculty	Spring 2015	Mark Oldham/Justus Adamons/DKU faculty	1-3 weeks demo
MP710 Radiation Protection (3 hr)	Durham/DKU faculty	Spring 2015	Haijun Song/DKU faculty	1-3 weeks demo
MP741 Nuclear Medicine Physics (3 hr)	Durham/DKU faculty	Spring 2015	Tim Turkington/James Bowsher/DKU faculty	1-3 weeks demo
MP751 Seminars in Medical Physics (1 hr)	Blended	Spring 2015	Blended	
Year Two Sample courses Radiation Therapy track Fall				
MP722 Advanced Photon Beam Radiation Therapy (3 hr)	Durham faculty	Fall 2015	Shiva Das/Jackie Wu/DKU faculty	
MP723 Advanced Brachytherapy and Special Topics (3 hr)	Durham faculty	Fall 2015	Fang-Fang Yin/Jing Cai/DKU faculty	
MP728 Clinical Practicum (RT) (3 hr)	Durham/DKU faculty and on-site faculty	Fall 2015	Zhiheng Wang/Lei Ren/DKU faculty and on-site faculty	
MP751 Seminars in Medical Physics (1 hr)	Blended	Fall 2015	Blended	
Thesis research credit (3 hr)	Durham/DKU faculty	Fall 2015	Durham/DKU/Adjunct faculty	
Year Two Sample courses Radiation Therapy track Spring				
MP770 Frontiers of Biomedical Science (3 hr)	Durham/DKU faculty	Spring 2016	Jackie Wu/James Chang/DKU faculty	
MP728 Clinical Practicum (RT) (3 hr)	Durham/DKU faculty	Spring 2016	Lei Ren/Zhiheng Wang/DKU faculty	
MP751 Seminars in Medical Physics (1 hr)	Blended	Spring 2016	Blended	
Thesis research credit (3 hr)	Durham/DKU faculty	Spring 2016	Durham/DKU faculty	

Year Two Imaging Physics track Fall				
MP748 Clinical Practicum and Shadowing (NM) (3 hr)	Durham/DKU faculty and on Site staff	Fall 2015	Tim Turkington/James Bowsher/DKU faculty and on Site staff	
MP723 Advanced Brachytherapy and Special Topics (3 hr)	Durham faculty (elective)	Fall 2015	Fang-Fang Yin/Jing Cai (elective)	
MP770 Frontiers of Biomedical Science (3 hr)	Durham/DKU faculty	Fall 2015	Jackie Wu/James Chang/DKU faculty	
MP751 Seminars in Medical Physics (1 hr)	Blended	Fall 2015	Blended	
Thesis research credit (3 hr)	Durham/DKU faculty	Fall 2015	Durham/DKU faculty	
Year Two Imaging Physics track Spring				
MP748 Clinical Practicum and shadowing (DI) (3 hr)	Durham/DKU faculty	Spring 2016	Joseph Lo/DKU/Adjunct faculty	
MP731 Advanced Medical Imaging Physics (3 hr)	Durham/DKU faculty	Spring 2016	Joseph Lo/James MacFall/James Bowsher/Adjunct/DKU faculty	
MP751 Seminars in Medical Physics (1 hr)	Blended	Spring 2016	Blended	
Thesis research credit (3 hr)	Durham/DKU faculty	Spring 2016	Durham/DKU faculty	

Appendix D: Comments from ECGF and Responses

Point-by-point Responses to ECGF Comments

By Fang-Fang Yin and James Dobbins

We appreciate the opportunity to discuss the proposal for establishing a Medical Physics Graduate Program at DKU with the ECGF and are grateful for the thoughtful and valuable comments from the committee members. We have prepared point-by-point responses as described below.

The key issue was a broad skepticism that the faculty resources at DKU are going to be adequate to make this a high quality MS program in Medical Physics. The main concerns were that the DKU program:

- 1) is not of the same quality as the program in Durham, yet both programs will result in the same degree from Duke;*

It is our expectation to develop a graduate program at DKU of the same high quality as the program at Duke-Durham, both for students and for faculty. We have planned various approaches to make sure that the educational quality of the first year DKU students should be comparable to that of the first year students at Duke.

We will do everything necessary to assure that we have an excellent quality faculty at DKU to provide high quality educational opportunities, comparable to MPPG-Durham, for DKU students.

We will draw our faculty at MPPG-DKU from three sources:

- 1) Faculty equivalent to two FTEs will be recruited at DKU for student teaching and mentoring. One of these will commit partial effort to serve as the Director of Graduate Studies for MPPG-DKU. There will be an international search for these recruited faculty. Their primary responsibilities will be teaching and mentoring students on site. Each FTE will cover teaching of 2-4 courses per year, mainly for the first year graduate student core courses and 1-2 advanced specialty courses. Our expectation is to have them work extensively with Duke Faculty to get familiar with our teaching style and develop comparable teaching quality for the courses taught at DKU. Slowly, they will take over most, if not all, teaching duties when the quality is acceptable as judged by the Duke faculty. Several individuals have expressed strong interest in these new faculty positions at DKU and a few are listed below (These individuals communicated their interest to us not based on advertising, since we are not yet an approved program and therefore cannot begin the process of formal advertising for positions to hire. Therefore, when we are approved and can begin advertising, we anticipate there being a larger number of high quality candidates who may apply.) The individuals who have expressed interest so far are:

Dr. Lei Zhu (PhD in imaging physics and post-doctoral fellow in therapy physics from Stanford University) is a lead faculty member in the Medical Physics Graduate Program at Georgia Tech Medical Center; he has 4 years of teaching and mentoring experience. His CV is attached.

Dr. Rong Yi (PhD in Medical Physics from University of Wisconsin – Madison) is Clinical Physics Faculty at Ohio State University with 5 years of clinical experience in Radiation Therapy Physics. She is certified by the American Board of Radiology (ABR). Her letter is included below and her CV is attached.



Dear Dr. Yin,

I am very interested in the faculty position at Duke Kunshan University in China. I am currently a faculty member at the Ohio State University, but I have been searching for the opportunity to go back to work in China. My husband has been back and worked in Nanning for several years. I hope this job would be my great opportunity to devote my knowledge and career in China and also reunion with my family.

Attached please find my most updated CV. Please let me know if you need any more information.

Thank you so much for your consideration.

Yi Rong, PhD
Assistant Professor
The Ohio State University.

Dr. Peng Zhou (PhD in Physics, MS in Medical Physics from Wayne State University, 2-year CAMPEP residency in Radiation Therapy Physics from Indiana University). Two years ago, Duke Radiation oncology faculty evaluated his application to be one of our Duke clinical medical physics residents and ranked him as the top candidate. We judged him to have a solid background in basic sciences and research, excellent presentation skills and extremely pleasant personality. Unfortunately, he accepted a position at Indiana University before we could officially make him an offer at Duke. His CV is attached, and his letter of interest is below.

From: Peng Zhou [mailto:zhpeng116.ustc@gmail.com]
Sent: Monday, August 12, 2013 5:31 PM
To: Fang-Fang Yin, Ph.D.
Subject: About physicist position in China

Dear Prof. Yin

This is Peng Zhou who met you during AAPM meeting. I hope you had a great time in Indy last week. I should thank you first to let me know that great physicist opportunity.

I am sorry that I did not have more chance to talk to you about the position working in China you mentioned. I am pretty interested in that position and could you please give me more information about that or could you let me know where I could find more information?

Thank you again for your help

Best
Peng Zhou
Senior Medical Physics Resident

Department of Radiation Oncology
Indiana University School of Medicine
Indianapolis, IN 46202

- 2) One FTE equivalent at Duke for teaching and mentoring at DKU (Duke faculty will travel there for classroom teaching of courses). Since we are not able to recruit faculty in Kunshan until the program is approved, having Duke faculty actively involved can play two important roles 1) Duke faculty can fill the gap before DKU faculty can take over full responsibility for student teaching, mentoring and other activities; 2) Duke faculty can guide new faculty at DKU to adopt Duke practices and procedures to make sure that we foster an equivalent teaching experience at DKU. As we indicated in the proposal, there are more than 26 Duke faculty members who are part of our medical physics program in Durham and are interested in being involved in DKU activities. They are especially interested in mentoring MS graduate students, which indicates that there is additional capacity to mentor more MS students than in our current Durham program. Some of these Durham faculties who will be involved in DKU teaching are listed below.
- >Mark Oldham, PhD, Professor of Radiation Oncology (both MS and PhD mentor) 10%/year effort toward DKU teaching and mentoring (one full course) – Will teach the Radiation Therapy Physics core course during the second semester together with Dr. Lei Ren.
 - >Lei Ren, PhD, Assistant Professor of Radiation Oncology (MS mentor) 10%/year effort toward DKU teaching and mentoring (one full course) – Will teach the Radiation Therapy Physics core course during the second semester together with Dr. Oldham.
 - >Qiuwen Wu, PhD, Professor of Radiation Oncology (both MS and PhD mentor) 10%/year effort toward DKU teaching and mentoring (one full course) – Will teach the Radiation Physics core course during the first semester.
 - >James Bowsher, PhD, Assistant Professor of Radiation Oncology (both MS and PhD mentor) up to 25% effort toward DKU teaching and mentoring. Will teach the Nuclear Medicine core course in the second semester and/or the Radiation Physics core course.
 - >James MacFall, PhD, Professor of Radiology and Biomedical Engineering (Both MS and PhD mentor), up to 10%/year effort toward DKU teaching and mentoring. Will teach the Modern Diagnostic Imaging core course together with Dr. Anuj Kapadia.
 - >Anuj Kapadia, PhD, Assistant Professor of Radiology (both MS and PhD mentor) 10% effort toward DKU teaching and mentoring. Will teach Modern Diagnostic Imaging together with Dr. James MacFall.
 - >Zhiheng Wang, PhD, Associate Professor of Radiation Oncology (both MS and PhD mentor) 10%/year efforts toward DKU teaching and mentoring. Will teach the Radiation Oncology Physics Practicum course together with DKU faculty.
 - >Jackie Wu, PhD, Associate Professor of Radiation Oncology (both MS and PhD mentor) 10%/year efforts toward DKU for mentoring. Will teach advanced brachytherapy and special procedures in the fourth semester.

- > Haijun Song, PhD, Assistant Professor of Radiation Oncology (both MS and PhD mentor) 10%/year effort toward DKU teaching and mentoring. Will teach the Radiation Protection core course together with DKU faculty
 - > Jing Cai, PhD, Assistant Professor of Radiation Oncology (MS mentor) 10%/year effort toward DKU teaching and mentoring. Will teach advanced brachytherapy and special procedures in the fourth semester together with DKU faculty
- 3) Adjunct Faculty from affiliated university hospitals in the Kunshan area. These faculty will be evaluated and potentially recruited after the program is approved in order to enhance DKU teaching, practicum, and research activities. The process for evaluation of adjunct faculty will be the same as at Durham: 1) application from the candidate, 2) initial evaluation by the Medical Physics Administrative Council (MPAC) at MPPG-Durham; 3) evaluation and a vote by the Durham faculty body, and 4) approval by Duke Graduate School and/or DKU. For the practicum course, we only need 2-3 sites. However, for research collaboration, the more sites we have the better for students to choose research projects of interest to them. Listed below are some of the individuals who have expressed strong interest to be associated with DKU as either potential clinical practicum sites or adjunct faculty members. Please note that all these contacts are very preliminary and informal due to our program not being approved yet. During the next a few months, we will be officially visiting a few university hospitals in the Kunshan area to do a more formal evaluation of potential candidates and practicum sites. Some emails of recognitions from sites are also included.

Zheng, Xiangpeng, MD, PhD, Associate Professor
Department of Radiation Oncology, Huadong Hospital, Fudan University.
He had PhD degree from UT Texas in Radiation Biology. He expressed strong interest to teach Anatomy and Physiology and Clinical Shadowing. He also expressed interest to be one of clinical practicum site for DKU students and his qualification is attached.

Dear Dr. Yin,

Guess you have been home as you read this mail. From the Varian Oncology Summit to the Hangzhou Meeting, it is really a busy and exhausting trip. One of my friend told me that he saw you running in the Qingdao beach. Could that be a tip to keep fit and vigorous?

We have met a couple of times previously though. It is still a great honor to have a talk with you in Hangzhou. And glad to know some of your plans regarding the Duke-Kunshan campus. I am eager to be part of that, if possible. We will do whatever it takes to have that opportunity to get involved. Attached is my C.V. It also will be a honor to have you come to our department for a visit and give us some lectures at your next trip.

By the way, one of my best friends, Ming LIAO, graduated from Duke at 2004 (Ph.d at Statistics and Decision Science) and his wife from UC State (Ph.d at Industrial engineering). Currently he is a director in Unilever in Shanghai and she is a professor in the Department of Management, Fudan University.

Look forward to seeing you soon!

Best regards,

Xiangpeng Zheng
郑向鹏 复旦大学附属华东医院放疗科

Zheng, Xiangpeng, MD, PhD
Department of Radiation Oncology,
Huadong Hospital, Fudan University

Zhenjiang University Hospital
Deyu Chen (Professor, Radiation Oncologist and Vice President)

The hospital has the same state-of-the-art equipment as Duke for advanced radiation therapy. This will be one of our clinical practicum sites so that Duke/DKU faculty can use this facility to teach the practicum course with some assistance from the hospital technical staff.

From: 陈德玉 [mailto:cdeyu@hotmail.com]
Sent: Thursday, September 19, 2013 11:05 PM
To: Fang-Fang Yin, Ph.D.
Subject: RE: trial

Dear Professor Yin,
As you know we have been very insested in participating Duke Kunshan University Medical Physics Education.

We will be very happy if we have a opportunity to be one of your partnership and teaching base hospital. Thank you

very much.

Deyu Chen

The Second People's Hospital of Changzhou, Nanjing Medical University
Dr. Ni Xinye is a vice chair of radiation oncology and chief physicist, Department of Radiation Oncology. He holds PhD degree from Nuclear Engineering and had practiced Radiation Physics for 10 years. The hospital has 2 linear accelerators and some active clinical medical physics educational and research programs.

From: nxy2000@aliyun.com [mailto:nxy2000@aliyun.com]
Sent: Friday, September 20, 2013 10:28 AM
To: Fang-Fang Yin, Ph.D.
Subject: 回复:

Yin 教授, 您好:

我把个人资料已 email 到您医院了, 正等待消息。

如果我院能成为 Duke Kunshan University 实习和教育基地, 这不但对我个人也是对我单位都是非常有意义的一件事, 我们离昆山很近, 交流起来很方便。

谢谢

Ni xinye
2013-9-20

Zhejiang Cancer Hospital

Ming Chen, MD (Professor, Radiation Oncologist, Vice President of hospital)

Xiaoyun Di, MS (Professor and Chief Physicist)

Both of them spent one year at MD Anderson Cancer Center in Houston and University of Michigan Radiation Oncology Department. The hospital has over 9 treatment machines and treats over 600 patients daily. Also it has active research programs in biology, clinical trials, and physics quality assurance (QA). This will be one of the potential sites for students to do MS thesis in the future and also a practicum course site.

Cancer Hospital of Fudan University

Photon, electron, carbon and proton facility

Guo-liang Jinag, MD (Professor, Radiation Oncologist and past President)
Zhen Zhang, MD (Professor and Chair)
Zhiyong Xu, PhD (Chief physicist)
Weigang Hu, MS (Chief Physicist)
They spent more than one year at MD Anderson Cancer Center in Houston and University of California at San Francisco Radiation Oncology Department. The hospital has over 10 treatment machines and treats over 700 patients daily. Also it has active research programs in biology, clinical trials, and physics QA. This will be one of the potential sites for students to do MS thesis in the future and also a practicum course site.

Shandong Cancer Hospital

Jinming Yu, MD PhD (Professor, Radiation Oncologist, President of the Hospital)
Yong Yin, PhD (Professor and Chief Physicist)
They spent more than one year at major medical centers in US. The hospital has over 7 treatment machines and treats over 500 patients daily. Also it has active research programs in biology, clinical trials, and physics. They will be one of the potential sites for students to do MS thesis in the future and also a practicum course site.

From: 尹勇 [mailto:yongyinsd@163.com]

Sent: Thursday, September 19, 2013 10:49 PM

To: Fang-Fang Yin, Ph.D.

Subject: 来自尹勇的邮件

Dear Fang-Fang,

Your letter has been received, thank you very for your invitation about DKU Medical Physics Graduate Program. We are very glad to be one of our partnership hospital for students to conduct research and practicum, and we will provide the best possible convenience for students.

Best regards,

Yong Yin

Director & Professor of radiation physics department
Shandong Cancer Hospital
Jiyan Road 440#, 250117
Jinan city, Shandong Province
China
Telephone: +86-53167626427
Fax: +86-53167626427
E-mail: yongyinsd@163.com

Zhejiang University First Affiliated Hospital

Senxiang Yan, MD PhD (Radiation Oncologist, Professor and Chair)
He spent some time in US in the past and will spend a few months at Duke Radiation Oncology. The hospital has 2 advanced treatment machines (with PET/CT as simulation tool) and treats over 100 patients daily. Also it has active research programs, clinical trials, and imaging. They will be one of the potential sites for students to do MS thesis in the future and also a practicum course site.

Beijing University

Guangying Zhu, MD PhD (Professor, Radiation Oncologist, Chair)
Hao Wu, MS (Professor and Chief Physicist)

One of them spent one year at MD Anderson Cancer Center in Houston Radiation Oncology Department. The hospital has over 5 treatment machines and treats over 400 patients daily. Also it has active research programs in clinical trials and physics QA. They will be one of the potential sites for students to do MS thesis in the future and also a practicum course site.

From: zgypu [mailto:zgypu@aliyun.com]
Sent: Thursday, September 19, 2013 7:39 PM
To: Fang-Fang Yin, Ph.D.
Subject: 答复:

Dear Prof. Yin,
Thank you very much for your email. I am interested in participating the DKU Medical Physics Graduate Program. We will be happy to be one of the partnership hospital for students to conduct research and practicum. We can discuss it in detail later.
Best
Guangying Zhu

Chinese Academy of Medical Sciences, Cancer Hospital
Yexiong Li, MD (Professor and Chair, Radiation Oncologist)
Yiming Hu (Professor, President of Chinese Society of Medical Physics)
Jianrong Dai, PhD (Professor and Chief Physicist)
They all spent more than one year at European and US Radiation Oncology Departments. The hospital has over 9 treatment machines and treats over 700 patients daily. Also it has active research programs in biology, clinical trials, and physics QA. They are very interested to be one of potential sites for students to do MS thesis in the future and also a practicum course site.

In addition to these faculty discussed above, the Director of the DKU program will be coordinating courses together with the DGS at DKU to ensure that the Duke curriculum and quality of teaching is implemented at DKU. The Program Director will also spend 10-20%/year effort toward DKU for teaching and mentoring in order to develop a high quality DKU Medical Physics Graduate Program. The Director will oversee a course to be taught on Advanced Brachytherapy and Special Procedures.

The level of teaching support listed above is equivalent to that in our highly successful Duke program. We typically have 5-6 instructors teaching in one semester, each teaching one course. If DKU faculty can teach 2 courses per semester, there are only two courses that will need to be offered by Duke Faculty traveling to Kunshan, without any support from adjunct faculty. Therefore, the current faculty arrangement is comparable to the Durham active faculty teaching level.

In terms of research mentoring, there are more than 26 Duke faculty members expressing an interest to do so. Prior to the onsite and adjunct faculty at DKU managing the entire cohort of

mentoring (as may happen in several years as the program comes up to speed), there are enough resources at Duke to fill this gap during the initial phase.

The admissions requirements will be the same as those set at MPGP-Durham to ensure that the students are of comparable quality and background. The same admissions committee in Durham will be used for DKU applicants.

We have also planned to use the same metrics to assess the success of the MPGP-DKU as we did at Durham. Furthermore a comprehensive assessment plan is under development to establish and monitor program goals and compare the Duke and DKU programs through the use of critical benchmarks along the way when the program starts. This assessment will be accomplished with established criteria in the field of program assessment, including the use of critical thinking instruments, well-developed rubrics for course and program evaluation, statistical comparison of outcomes on capstone projects (especially but not limited to the Master's Degree thesis), and strategic adaptive feedback at frequent intervals to adjust programming, etc.

- 2) *seems likely to have a negative impact on the Durham program, particularly on Duke MPGP faculty asked to commit considerable time and effort on the DKU program in any case, unless less reliance is placed on Durham program resources than in the current proposal.*

It is our expectation that MPGP-DKU will be a self-supporting Duke quality program in the near future. However, the initial development phase of the program will heavily involve Duke Faculty to ensure a Duke quality program at DKU. Thus, the heavy involvement by Durham faculty is anticipated only during the initial start up phase, with ongoing involvement by Durham faculty of a more limited nature once the regular adjunct faculty at DKU are hired and up to speed.

More than half of the MPGP-Durham faculty have expressed strong interest to be involved in the MPGP-DKU program because of the high societal value in an area of rising economic growth and because of the opportunity to expand the global research opportunities and outreach of our Durham campus. In addition, in the third semester, DKU students coming to MPGP-Durham will be distributed to multiple faculty mentors and will take courses for which the Durham faculty will be compensated. We do not see these additional students in the 3rd semester courses as being putting an unreasonable strain on our teaching faculty because, the courses in the 3rd semester when DKU students are in Durham are the non-core courses. These courses are less populated than the core courses and so having 4-7 additional students in each of these classes should not be unduly burdensome on the Durham faculty. Therefore, there will be minimal incremental burden to the existing teaching faculty at MPGP-Durham. We do agree that mentoring MS thesis research is time consuming and can be relatively a heavy workload. The DKU program director will work hard to distribute mentoring effort among a pool of Duke and DKU faculty. Mentoring faculty will also receive from DKU some modest compensation for mentoring. As the program develops, Duke-quality faculty at DKU will continuously be added to replace faculty mentoring effort from Durham. Eventually, it will be a self-supporting high quality graduate program with most of the teaching and mentoring effort handled by the faculty at DKU.

Therefore, we do not feel the involvement of Duke faculty at DKU is unreasonably burdensome, especially in view of the committed time and effort from Duke being properly compensated, thereby allowing hiring of additional staff at Durham. Duke-based faculty will receive some modest compensation for student thesis mentoring, but more important, they will be expanding their research collaborations and increasing their academic productivity through their participation. As will be discussed later (last page), the mentoring for students coming from DKU may be a plus to our faculty at Durham. Our Durham faculty want Masters Students in their labs in order to increase their research productivity, and we have additional capacity for such mentored slots here in Durham. In fact, in the 2010-11 academic year we matriculated about twice our anticipated number of MS students (due to an unexpectedly large yield on admissions offers that year following the economic recovery), and we were able to handle almost 30 new MS students that year for mentoring with no problem. Many of our Durham faculty want additional MS students in their labs. Therefore, having an additional 15 MS students per year from DKU doing thesis work in collaboration with Durham faculty will be an advantage, not a disadvantage, for our faculty in Durham.

We also feel it is critical to have close connections between Duke and DKU to maintain the Duke quality at DKU. As this expertise and quality is established, DKU will become increasingly less dependent on faculty resources from Duke.

Much of the fundamental problem underlying both concerns is a lack of clearly qualified and committed local faculty and training resources.

We understand the concerns and our program design has balanced teaching and research activities from participating Duke Faculty. Our current faculty staffing plan includes 2 new FTE faculty positions for hiring at DKU plus one equivalent FTE position from existing Duke faculty, and 10-20% on-site efforts from the Program Director (also involving teaching of advanced brachytherapy and special procedures in the fourth semester and mentoring). For a cohort of 15 graduate students with 3 or more FTE Duke/DKU Faculty (plus some potential adjunct faculty from China) primarily for teaching activities, we feel that the requirements are reasonably covered for a high quality MS education program in the initial phase, especially during the first year. However, if additional resources are needed, the program at Duke will consider providing any additional support as needed to ensure high quality.

The following are some Duke Faculty who are committed and will able to teach and mentor at DKU for the first 1-2 years:

- >Mark Oldham, PhD, Professor of Radiation Oncology (both MS and PhD mentor) 10%/year effort toward DKU teaching and mentoring (one full course) – Will teach the Radiation Therapy Physics core course during the second semester together with Dr. Lei Ren.
- >Lei Ren, PhD, Assistant Professor of Radiation Oncology (MS mentor) 10%/year effort toward DKU teaching and mentoring (one full course) – Will teach the Radiation Therapy Physics core course during the second semester together with Dr. Oldham.

- >Qiuwen Wu, PhD, Professor of Radiation Oncology (both MS and PhD mentor) 10%/year effort toward DKU teaching and mentoring (one full course) – Will teach the Radiation Physics core course during the first semester.
- >James Bowsher, PhD, Assistant Professor of Radiation Oncology (both MS and PhD mentor) up to 25% effort toward DKU teaching and mentoring. Will teach the Nuclear Medicine core course in the second semester and/or the Radiation Physics core course.
- >James MacFall, PhD, Professor of Radiology and Biomedical Engineering (Both MS and PhD mentor), up to 10%/year effort toward DKU teaching and mentoring. Will teach the Modern Diagnostic Imaging core course together with Dr. Anuj Kapadia.
- >Anuj Kapadia, PhD, Assistant Professor of Radiology (both MS and PhD mentor) 10% effort toward DKU teaching and mentoring. Will teach Modern Diagnostic Imaging together with Dr. James MacFall.
- >Zhiheng Wang, PhD, Associate Professor of Radiation Oncology (both MS and PhD mentor) 10%/year efforts toward DKU teaching and mentoring. Will teach the Radiation Oncology Physics Practicum course together with DKU faculty.
- >Jackie Wu, PhD, Associate Professor of Radiation Oncology (both MS and PhD mentor) 10%/year efforts toward DKU for mentoring. Will teach advanced brachytherapy and special procedures in the fourth semester.
- >Haijun Song, PhD, Assistant Professor of Radiation Oncology (both MS and PhD mentor) 10%/year effort toward DKU teaching and mentoring. Will teach the Radiation Protection core course together with DKU faculty
- >Jing Cai, PhD, Assistant Professor of Radiation Oncology (MS mentor) 10%/year effort toward DKU teaching and mentoring. Will teach advanced brachytherapy and special procedures in the fourth semester together with DKU faculty

In addition to Duke Faculty, Duke will hire two more FTE faculty positions for the first year and will hire more as needed. Some of candidates who have expressed interest to work for DKU are listed below:

Dr. Lei Zhu (PhD in imaging physics and post-doctoral fellow in therapy physics from Stanford University) is a lead faculty member in the Medical Physics Graduate Program at Georgia Tech Medical Center; he has 4 years of teaching and mentoring experience. His CV is attached.

Dr. Rong Yi (PhD in Medical Physics from University of Wisconsin – Madison) is Clinical Physics Faculty at Ohio State University with 5 years of clinical experience in Radiation Therapy Physics. She is certified by the American Board of Radiology (ABR). Her letter is included below and her CV is attached.

Dr. Peng Zhou (PhD in Physics, MS in Medical Physics from Wayne State University, 2-year CAMPEP residency in Radiation Therapy Physics from Indiana University). Two years ago, Duke Radiation oncology faculty evaluated his application to be one of our Duke clinical medical physics residents and ranked him as the top candidate. We judged him to have a solid background in basic sciences and research, excellent presentation skills and extremely pleasant personality.

Unfortunately, he accepted a position at Indiana University before we could officially make him an offer at Duke. His CV is attached.

In addition, there are currently Duke faculty who are jointly conducting research with investigators in China. Those faculty often travel to China and are very interested to combine some DKU teaching and mentoring activities. As a result, the Duke Faculty presence at DKU could be increased noticeably by enhancing these joint research activities.

We are also considering establishing a medical physics research institute at DKU in collaboration with our affiliated sites, and if this is successful, it should enhance the opportunity for more faculty to conduct needed research there.

We also verbally/informally contacted a few US scientists who are now working in China near Kunshan: including Qiang Li, PhD (formerly of the Ravin Advanced Imaging Labs in the Duke Department of Radiology and now at a Research Institute in Shanghai) and Jianhui Zhong, a well-known MRI physicist (formally Professor of Radiology at the University of Rochester – a former colleague of DKU Program Director, Dr. Yin). Both of them expressed interest in the DKU MP Program and at least could be involve in mentoring student thesis research. We will finalize these activities when the program obtains approval.

During the first year, the need for affiliated sites is minimal since the students will be taking the core courses and will not be in the clinic on a regular basis. If needed for instructional purpose, hardware from the facility of local hospitals can be used for demonstration purposes, but this would be minimal. All teaching and supervision will be done by Duke/DKU faculty.

It would be very helpful if you would answer the following questions as specifically as possible:

- 1) *Who in China will be doing the supervision of the clinical practicum?*
 - a. The practicum course includes 8 projects through the course. Each project involves a clinical physics topic (such as beam data, TG-51 calibration, treatment simulation and planning, treatment delivery, QA routine and IMRT, brachytherapy, TBI and TSI treatment) with a 3-hour practical illustration of operation by an instructor.
 - b. For the first class of MP graduate students, we will do the practicum during the 3rd semester while they are at Duke. During this time, we will be finalizing sites and training staff to assist Duke/DKU faculty for teaching on site in the Kunshan area. With this arrangement, we anticipate all students will take practicum at Duke while they are at Duke Durham campus. It is anticipated that during the summer after the second semester and following fall semester, they will do three things in addition to taking the seminar course: 1) take a practicum course; 2) take an advanced course; and 3) take an elective course or research. This is one of important reasons why the Durham semester is designed.
 - c. To do so, we plan to make two sessions of the practicum course per week at Duke. We have done so in the past for Duke Students.
 - d. As a backup, if practicum has to be done in China, we will send Duke/DKU Faculty to DKU for supervision and teaching of the practicum.

-
- e. We have been and will continue to train physicists at affiliate hospitals and DKU faculty to be able to take over this course with the same quality in China in the near future.
- 2) Who in China will be doing the thesis project supervision?
 - a. The primary mentor will be a collaboration of Duke and DKU faculty, since most research will be done during their stay at Duke. We will also assign a co-mentor for each student from DKU or potentially an adjunct faculty, as approved by the Duke, from the affiliated university hospitals when it becomes available if the principal mentor resides in Durham.
 - b. We have followed a similar procedure for many German MS graduate students for 6 months of thesis research during the past 7 years.
 - 3) Where will the student work of these two requirements occur?
 - a. This could be done mostly at Duke (during the summer and third semester)
 - b. or at DKU for additional work or data analysis or writing (a computer lab will be available at DKU).
 - c. or at one of the affiliated hospitals in China if the project requires the use of some resources/equipment in affiliated hospitals
 - d. Participation by Duke Faculty could be done remotely or during the site visit of Duke Faculty. Note that there will always be a DKU mentor or co-mentor on site in Kunshan, so that it is clear that students will not be left without an on-site mentor.
 - 4) Which if any of these people will also be involved in teaching the courses at DKU?
 - a. If they are Duke or DKU faculty, some of them will be involved in teaching. At Duke, not all mentors are involved teaching and not all teaching faculty are involved in mentoring.
 - b. If they are Duke-approved adjunct faculty, they may partially be involved in teaching too.
 - c. All DKU faculty will be involved in teaching.
 - d. Specific individuals for each course are listed in a section above.
 - 5) Which if any of these people will also serve on thesis examination committees?
 - a. If they are Duke-approved faculty, they may serve as thesis committee per approval by DGS at DKU.

Given that many if not all of these people are not Duke Faculty, we would like to see evidence of their qualifications and their willingness. Letters of support and CVs from several individual key faculties are requested, as well as letters of support from partner hospitals.

As DKU has just last week been officially approved by the Ministry of Education in China, and the MPGP-DKU is still in the process of approval by the Duke chain of command, we have not yet been allowed to officially begin recruiting faculty and affiliates. However, as soon as we are allowed to do so, we will do so with due diligence. Therefore, all of our contacts of potentially interested individuals are preliminary at this point. However, we have had a number of qualified individuals indicate their interest, even at this stage prior to formal approval.

As listed in the proposal, all faculty will be either Duke or DKU faculty for teaching and mentoring. Any member or staff in the affiliated hospitals will be evaluated by the MPGP-Durham Administrative Council (MPAC) and the Duke Graduate School before they will be considered as instructors or adjunct faculty. The process will be the same as that which we use to evaluate faculty and associates at Duke. This may change in the future if DKU takes over faculty appointment responsibility.

DKU faculty will be recruited internationally following Duke's guidelines. Some high quality individuals have expressed interest for the positions. Examples are listed below in addition to some potential internal candidates:

Dr. Lei Zhu (PhD in imaging physics and post-doctoral fellow in therapy physics from Stanford University) is a lead faculty member in the Medical Physics Graduate Program at Georgia Tech Medical Center; he has 4 years of teaching and mentoring experience. His CV is attached.

Dr. Rong Yi (PhD in Medical Physics from University of Wisconsin – Madison) is Clinical Physics Faculty at Ohio State University with 5 years of clinical experience in Radiation Therapy Physics. She is certified by the American Board of Radiology (ABR). Her letter is included below and her CV is attached.

Dr. Peng Zhou (PhD in Physics, MS in Medical Physics from Wayne State University, 2-year CAMPEP residency in Radiation Therapy Physics from Indiana University). Two years ago, Duke Radiation oncology faculty evaluated his application to be one of our Duke clinical medical physics residents and ranked him as the top candidate. We judged him to have a solid background in basic sciences and research, excellent presentation skills and extremely pleasant personality. Unfortunately, he accepted a position at Indiana University before we could officially make him an offer at Duke. His CV is attached.

We also verbally/informally contacted a few US scientists who are now working in China near Kunshan: including Qiang Li, PhD (formerly of the Ravin Advanced Imaging Labs in the Duke Department of Radiology and now at a Research Institute in Shanghai) and Jianhui Zhong, a well-known MRI physicist (formally Professor of Radiology at the University of Rochester – a former colleague of DKU Program Director, Dr. Yin). Both of them expressed interest in the DKU MP Program and at least could be involve in mentoring student thesis research. We will finalize these activities when the program obtains approval.

What we are asking for is more evidence that a strong program can be built at DKU, with no more reliance on Durham than necessary. There was concern that the clinical practicum and thesis research projects would be better not to be exported en masse to Durham. The Duke faculty will already be called on to spend considerable effort on the DKU program in traveling there to teach, and they have to run a high quality program here as a first priority. Many of these faculties also have considerable responsibility outside the program. Accordingly, adding 15+ more MS students per year for high contact-hour practicum and/or thesis work appears to be a considerable additional burden. Moreover, there is concern that DKU students in Durham would be on the bottom of a two-tier student body, a structure not in the interest of either the DKU or Durham MPGP MS students.

It is our intention to build a strong program mainly based at DKU. Plans for identifying potential hires for DKU faculty and additional adjunct faculty in China are well underway. However, we felt it is important to include Duke faculty in all aspects of the graduate program during the initial phases of DKU program in order to maintain the quality of Duke graduate program. As mentioned before, the time and effort spent by Duke faculty will be compensated and proportional staffing will be added to meet these changes. The faculty instructors for the practicum course at Duke has discussed this and felt it is manageable for an additional section of the practicum course at Duke for one or even a few years. We have had almost 30 MS students at Durham once previously, and were able to handle that load without difficulty.

It is our target to enroll 14-16 MS students per year in Durham, but in one academic year (2010-11) we ended up with a larger cohort of matriculated MS students because we unexpectedly had twice the yield that year than we had anticipated. Even with that unexpectedly large entering class of about 30 MS students, we managed well and were able to accommodate all of the MS students with thesis projects and practicum training. This gives us confidence that we have excess capacity in our faculty in Durham to accommodate the additional number of MS students from DKU who may wish to do a co-mentored thesis with Durham faculty members. Therefore, we will not see major issues for these additional 15 DKU students since currently we only enroll about 15 MS graduate students in Durham per year. Some of our faculty are not able to get graduate students as they would like to, so having additional students for thesis research would actually be a plus for our Durham faculty.

Duke faculty are involved in many professional and scientific activities in a variety of professional societies, and these efforts do take time. However, we see the education of future generations of medical physicists as one of our core missions as academic medical physicists, and our faculty are firmly committed to this educational enterprise.

In addition to societal benefits, mentoring of MS graduate students has proven to be very beneficial to our faculty in terms of enhancing their academic productivity and career. One example listed below shows that a junior faculty with a few years of mentoring several graduate students has generated a number of high quality publications in major radiation therapy journals and presentations in annual scientific meetings (red labels were MS graduate students). In addition to this example below of a junior faculty member's productivity being enhanced by having MS students, we would also point out that our total cohort of MS and PhD students in the Durham MPPG have had high scholarly output, with over 400 publications and presentations in the last 8 years.

Peer-reviewed Journal Papers

1. **Zhang F**, Kelsey C, Yoo D, Yin FF, **Cai J**. Uncertainties of 4DCT-based Tumor Motion Measurement for Lung SBRT. Practical Radiation Oncology (In Press)
2. **Qin Y**, Zhang F, Kelsey C, Yoo D, Yin FF, **Cai J**. Adaptive Stereotactic-Body Radiation Therapy (SBRT) Planning for Lung Cancer. Int J Radiat Oncol Biol Phys 2013 Sep 1;87(1):209-15.
3. **Panta RK**, Segars WP, Yin FF, **Cai J**. Implementing 4D-XCAT Phantom for 4D Radiotherapy Research. J Can Res Ther 2012;8:565-570.

4. **Zhang F**, Hu J, Kelsey C, Yoo D, Yin FF, **Cai J**. Reproducibility of Tumor Motion Probability Distribution Function (PDF) in Stereotactic Body Radiation Therapy (SBRT) of Lung Cancer. *Int J Radiat Oncol Biol Phys* 2012;84(3):861-866.

Conference Presentations (indicates Oral)*

1. **Turner K**, Zhang Y, Vergalasova I, Ren L, Segas P, Kelsey C, Yoo D, Yin FF, **Cai J**. Investigation of CBCT-based patient positioning accuracy in lung SBRT: correlation with breathing irregularity. 2013 AAPM Annual Meeting, Indianapolis, IN
2. **Qin Y**, Kelsey C, Yoo D, Yin FF, **Cai J**. Adaptive Stereotactic-body Radiation Therapy (SBRT) Planning for Lung Cancer: Can We Predict Who Will Benefit?. 2013 AAPM Annual Meeting, Indianapolis, IN
3. **Turner K**, Zhang Y, Vergalasova I, Segars P, Ren L, Yin FF, **Cai J**. Breathing irregularity induced uncertainties in patient positioning of lung SBRT: an investigation based on digital human phantom. 2013 ASTRO Annual Meeting, Atlanta, GA
4. **Qin Y**, Zhang F, Kelsey C, Yoo D, Yin FF, **Cai J**. A Correlation Study of the Relationship between Patient Factors and Dosimetric Effects of Adaptive Stereotactic Body Radiation Therapy (SBRT) for Lung Cancer. 2013 ISRS, Toronto, Canada
5. **Zhang F**, Wang Z, Kelsey C, Yoo D, Yin FF, **Cai J**. Statistics of Lung SBRT at Duke University. 2012 The 5th North Carolina IMRT/IGRT Symposium. Durham, NC.
6. **Qin Y**, Zhang F, Kelsey C, Yoo D, Yin FF, **Cai J**. Dosimetric Effects of Adaptive Treatment Planning for Stereotactic-Body Radiation Therapy (SBRT) for Lung Cancer. 2012 The 5th North Carolina IMRT/IGRT Symposium. Durham, NC. (**Best Poster Award, 1st Place**)
7. **Turner K**, Zhang Y, Vergalasova I, Yin FF, **Cai J**. A Simple Method to Minimize Uncertainty in ITV Delineation: Phantom Verification. 2012 AAPM Annual Meeting, Charlotte, NC.
8. **Zhang F**, Qin Y, Segars WP, Yin FF, **Cai J**. Verification of 4D Dose Delivery Using 4D Digital Human Phantom. 2012 AAPM Annual Meeting, Charlotte, NC.
9. **Qin Y**, Chang Z, Segars WP, Yin FF, **Cai J**. 4D-MRI Based On Body Area (BA) Surrogate and Sagittal Image Acquisition. 2012 AAPM Annual Meeting, Charlotte, NC.
10. **Panta R**, Segars WP, Yin FF, **Cai J**. Implementing 4D XCAT Phantom for 4D Radiotherapy Research. 2012 AAPM Annual Meeting, Charlotte, NC.
11. **Qin Y**, Zhang F, Kelsey C, Yoo D, Yin FF, **Cai J**. Adaptive Stereotactic-Body Radiation Therapy (SBRT) Planning for Lung Cancer. 2012 AAPM Annual Meeting, Charlotte, NC.
12. **Zhang F**, Kelsey C, Yin FF, **Cai J**. Correlation between external respiratory surrogate motion and internal lung tumor motion: a statistical view. 2011 ASTRO Annual Meeting, Miami, FL.
13. **Zhang F**, Hu J, Kelsey C, Yin FF, **Cai J**. Inter-fractional Reproducibility of Lung Tumor Motion Probability Distribution Function (PDF) in Stereotactic Body Radiation Therapy (SBRT). 2011 AAPM Annual Meeting, Vancouver, Canada.

We would like to continue and conclude our deliberations about your proposal at our next meeting, on 24 Sept. I would appreciate your sending me the materials and answers requested above so they can be distributed to the committee in advance.

We look forward to your favorable consideration. Thank you again for your time and effort to review this proposal.

Attachments: Sample CV's for potential DKU faculty and Adjunct DKU faculty

Appendix E: Comments from BSFSC and Responses

October 4, 2013

Herman F. Staats, Ph.D.
 Chair, Basic Sciences Faculty Steering Committee (BSFSC)

Dear Dr. Staats,

We wish to express our sincere appreciation to you and all committee members of BSFSC for your careful review of our proposal for establishing a Master Degree Program in Medical Physics at DKU as well as thoughtful comments about the contents of the proposal. We also thank you for allowing us to provide point-by-point responses to these comments as addressed following.

Questions/comments related to the MPGP DKU proposal

- Although the need for a Medical Physics program in China was nicely described in the proposal for the MPGP DKU program, how many market surveys have been performed to determine if the hospitals in China will support such a program by actually hiring graduates?

The market survey was done by the Chinese associations of Radiation Oncology and Medical Physics (2006, 2011). It was estimated that China will need at least 1500 medical physicists by year 2020, mainly due to the increases of patient number under radiation therapy, treatment complexity, and treatment facility, etc. Some emerging countries nearby appear to have similar demands. An article was published in the International Journal of Radiation Therapy Physics Biology about 5 years ago indicated that, in mainland China, the advanced treatment machines will be substantially increased and there is a serious shortage of medical physicists to match the demands for advanced radiation therapy practices. This article dealt only for radiation oncology physicists and did not include future needs for imaging physicists in hospitals, etc.



Int. J. Radiation Oncology Biol. Phys., Vol. 70, No. 3, pp. 795-798, 2008
 Copyright © 2008 Elsevier Inc.
 Printed in the USA. All rights reserved.
 0360-3016/08/\$-see front matter
 doi:10.1016/j.ijrobp.2007.10.017

CLINICAL INVESTIGATION Radiation Oncology Practice

THE GROWTH OF RADIATION ONCOLOGY IN MAINLAND CHINA DURING THE LAST 10 YEARS

WEIBO YIN, M.D.,^{*†‡} BO CHEN, M.D., M.S., M.B.,^{*} FENGHUA TIAN,^{*} YUN YU,^{*}
 AND FENG-MING KONG, M.D., Ph.D., M.P.H.[‡]

^{*}Chinese Society of Therapeutic Radiology and Oncology, Beijing, China; [†]Department of Radiation Oncology, Cancer Institute/Hospital, Chinese Academy of Medical Sciences, Peking Union Medical University, Beijing, China; and [‡]Sino-American Network for Therapeutic Radiology and Oncology, Beijing, China

- ◆ WHO Suggestion: 2-3 LA/million population
- ◆ USA: 8.2 LA/million
- ◆ UK: 3.4 LA/million
- ◆ France: 4 LA/million
- ◆ China: 0.97 LA/million in 2011

two to three linear accelerators per million population suggested by the World Health Organization (5), 3.4 per million population in the United Kingdom, 5 per million population in France (6), and 8.2 per million population in United States (7). In addition, the facilities are not reasonably distributed. Only Beijing, Shanghai, and Shandong had more than two units per million population. Rural and remote areas were much less well equipped (Table 3).

Advanced techniques are being implemented quickly by a large number of centers, and there has been a rapid increase in the number of physicist staff; the number of physicists is far from enough for the current number of physicians. The

ratio of physicist to radiation oncologist was about one physicist to four to five radiation oncologists in China comparing with four to five in the United States (8). More physicists are needed for the current facilities.

One must note this survey may not capture all the radiation oncology centers in mainland China because the registration system for radiation oncology centers was not established at that time. The list of radiation oncology centers was from national meeting participants and journal subscribers.

In summary, radiation oncology developed rapidly in the last 10 years. We expect much more growth to meet the needs of the population.

- The MPPG DKU proposal indicated that “The MPPG-DKU program will be carefully reviewed and evaluated every year by the MPAC-Durham...” but it was not clear how the review information would be used to determine if the MPPG DKU program was meeting its goal and what criteria would be used to determine if the program should be continued as proposed, modified or discontinued.

The admissions requirements will be the same as those set at MPPG-Durham to ensure that the students are of comparable quality and background. The same admissions committee in Durham will be used for DKU applicants.

We have also planned to use the same metrics to assess the success of the MPPG-DKU as we did at Durham. Furthermore a comprehensive assessment plan is under development to establish and monitor program goals and compare the Duke and DKU programs through the use of critical benchmarks along the way when the program starts. This assessment will be accomplished with established criteria in the field of program assessment, including the use of critical thinking instruments, well-developed rubrics for course and program evaluation, statistical comparison of outcomes on capstone projects (especially but not limited to the Master’s Degree thesis), and strategic adaptive feedback at frequent intervals to adjust programming, etc.

- *Developed infrastructure for the program*
- *Developed curriculum for the MPPG-DKU*
- *Organized application and admission process*
- *Develop collaboration with a few Chinese universities and hospitals, especially for clinical practicum*
- *Develop teaching/research infrastructures at DKU (organize potential courses, faculty, teaching format, instruction, program activities and administration)*
- *Develop and balance financial model*
- *Establish educational/training/research foundations for medical physics, etc.*
- *Recruit and produce high quality graduate students*

Questions/Comments related to the DKU program

The MPPG DKU proposal indicated that “The MPPG-Durham and any associated departments at Duke Durham campus bears no financial risk for the

program, ...”. However, Duke University Durham is providing financial support to the DKU mission. Faculty asked a variety of questions related to the finances of the DKU program, including:

- o How much financial support has Duke University Durham provided to DKU to date? How much additional financial support does Duke University Durham anticipate providing to DKU over the next 5 to 10 years?

The projected financial picture of DKU has not substantially changed since last presented to the Academic Council in the spring of 2013. Duke's financial contribution to operating DKU is estimated at approximately \$6 million per year for eight years: three years of startup and five years of operation in phase 1. However, because of delays in opening DKU, total expenditures for the first year of start-up were actually substantially lower, by an amount of approximately 2.3 million. The city of Kunshan will contribute an equivalent amount toward operating funds. In addition to operating funds, in spring 2013 Duke projected that it would spend approximately \$8 million on construction oversight.

Assuming that phase 1 is successful, negotiations with our partners for the financing of phase 2 and beyond will need to be undertaken once the campus is up and running.

- o How firm are the numbers of Chinese vs. foreign students?

The ratio between Chinese vs. foreign students can be flexible, at least initially.

- o How firm is the tuition for Chinese vs. foreign students?

Only now that we have received Establishment approval can we engage in full-scale negotiations with the provincial Pricing Bureau to negotiate our tuition levels. However over the past year we have made a good deal of the groundwork that should allow us to complete these negotiations in a relatively short time. We do anticipate that the price for PRC students will be substantially discounted with scholarship funds.

- o There may be financial shortfalls due, for example, to the numbers of Chinese vs. foreign students and/or due to the tuition for Chinese vs. foreign students. In the event of such financial shortfalls, what will be the liability of Duke University Durham versus other entities, i.e. Wuhan University, the local Kunshan government, and the Chinese government?

Please see attached letter from Executive Vice Provost Jim Roberts for a full explanation.

o What is the financial impact of support provided by Duke University Durham to the DKU program on other programs at Duke, including the School of Medicine? When will the financial support provided by Duke University Durham to the DKU program cease?

DKU accounts for about \$10M of the \$363M of planned SIP expenditure over the next 5 years, or about 3% of the total. Duke and the city of Kunshan's joint financial commitment to DKU extend to the end of phase 1, or about eight years. Financing of any future phases will have to be negotiated among the partners.

o Have the DKU buildings all been completely constructed to Duke University Durham standards? If not, when will construction of the DKU buildings be completed to Duke University Durham standards? In the latter case, how much more will completing construction of DKU buildings cost Duke University Durham?

The DKU buildings are not yet completed. We anticipate delivery of the buildings during the summer of 2014, in time to start classes in late August. Not every room of every building may be completely finished at that time, but there should be adequate facilities to begin classes and other activities. As construction has taken longer than anticipated, Duke's oversight has also taken longer than originally anticipated. This will increase oversight costs to some extent although exact figures are not yet available.

• It was announced recently that DKU had “received formal approval for the establishment of Duke Kunshan University (DKU) from China’s Ministry of Education”. Is this the last approval needed prior to enrollment of students and classes being taught at DKU?

Licensing of higher education institutions in China is a two-step process. In August 2012, DKU received Preparation approval, which allowed us to move forward in planning the institution. In September 2013, DKU received Establishment approval, which gives DKU license to open its doors. This is the last major approval needed from the Ministry of Education.

• The Chronicle recently published an opinion entitled “More questions about DKU” (<http://www.dukechronicle.com/articles/2013/09/17/more-questions-about-dku>) that discusses issues related to academic freedom in China. How has Duke University Durham ensured academic freedom for DKU faculty?

The fundamental principles by which DKU will operate have been specified and clearly described in the DKU application to the Ministry of Education, including in its Articles of Association, which is a public document available to the committee upon request. At no point in the process of preparing or submitting our application has any government body or our partners raised

any objections to these fundamental principles, which include most prominently academic freedom. Nevertheless, it is important to acknowledge that the past few months in particular have been difficult ones for China around this issue, and the situation on the DKU campus will require careful monitoring. The executive Vice Chancellor of DKU, Mary Bullock, will monitor these issues and make regular reports to the Duke University Provost, who in turn will make regular reports to the Academic Council.

- Given the distance of ~ 400 miles between Wuhan University and DKU, what is the final plan for the DKU campus? Will DKU be a full undergraduate university offering degree or will it only offer select courses and some master's programs?

Duke University and Wuhan University will remain partners in creating DKU, an independent legal entity that is a joint-venture university. In phase 1 (the first five years of operation), DKU will offer graduate degree programs and an undergraduate semester abroad program. In phase 2, DKU will add an undergraduate degree program, and is anticipated to continue to grow in terms of graduate studies. Ultimately, DKU is planned as a comprehensive university.

In addition, the DKU Medical Physics Graduate Program will ensure that all faculty and students involved in research that has regulatory considerations, including but not limited to human and animal use issues, will abide by all relevant approval processes and accepted ethical standards both in China and at Duke. All regulatory oversight requirements for such research required by Chinese authorities will be met, and in addition, all faculty and students involved in research will comply with the corresponding ethical/regulatory requirements at Duke. Such regulatory compliance will include IRB, IACUC, and all other relevant approval bodies. In no instance will a lesser standard of research ethics be practiced than would be required on the Durham campus.

Sincerely,

James Dobbins, PhD, Director of Medical Physics Graduate Program
Fang-Fang Yin, PhD, Associate Director of Medical Physics Graduate Program
Nora Bynum, PhD, Vice Provost, China & DKU Initiatives

Attachment: EVP's letter

Duke University
Durham, North Carolina
27708-0004

Office of the Executive Vice Provost
for Finance and Administration

September 5, 2013

127 Allen Building
Box 90004
Telephone (919) 684-3501
Facsimile (919) 681-7619

Memorandum

To: John Klingensmith

From: Jim Roberts 

Re: Financial Understandings Regarding the Proposed Master of Science in Medical
Physics/DKU

I am writing to provide some financial context for the ECGF's consideration of the proposed Master of Science in Medical Physics to be offered at DKU.

As with other programs developed or under development for DKU, my office has worked with program leaders to develop a business plan model based on initial goals and assumptions mutually judged to be reasonable. While plans will be adjusted based on experience, the basic structure is clear. Though the MSc in Medical Physics will be a Duke degree, the revenues and expenses of the program will be part of DKU. We project that the program will begin to cover its direct operating costs in the second year, with the enrollment of two cohorts in the two year program, and thereafter it will begin to contribute to the general operating costs of DKU (e.g. facilities, library, IT, student services and general administrative overhead). We do not expect DKU programs to cover fully allocated costs at this stage of development and thus DKU will require subsidy support consistent with the overall DKU financial plan and our agreement with the Municipality of Kunshan to jointly subsidize DKU operating costs to achieve world-class (Duke) quality.

The current Medical Physics proposal is consistent with the broader business plan for DKU investment that has been reported to the Academic Council and the Board of Trustees. Any financial risk associated with the program will be borne by DKU and not by the Medical Physics Program, the School of Medicine or the Duke Graduate School. As a financial partner in DKU, of course, the University through the Provost's Office has an interest in assuring the financial viability of programs offered at DKU. We are confident that the MSc proposal meets this criterion in the broader DKU context. The Provost's Office therefore endorses the proposed financial structure of the Medical Physics Master's program at DKU, bearing in mind that details will evolve with experience allowing us to set longer term financial expectations based on an empirical track record.

Please let me know if you have any questions.

JR/hc

xc: Peter Lange
Paula McLain
Nora Bynum
Jim Dobbins
Fang-Fang Yin

Appendix F: Comments from APC and Responses

Considerations for regulatory requirements regarding research

The DKU MP graduate program will ensure that all faculty and students involved in research that has regulatory considerations, including but not limited to human and animal use issues, will abide by all relevant approval processes and accepted ethical standards both in China and at Duke. All regulatory oversight requirements for such research required by Chinese authorities will be met, and in addition, all faculty and students involved in research will comply with the corresponding ethical/regulatory requirements at Duke. Such regulatory compliance will include IRB, IACUC, and all other relevant approval bodies. In no instance will a lesser standard of research ethics be practiced than would be required on the Durham campus.