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To: Lee Huntsman
Provost

From: Marsha Landolt
Dean

Re: Department of Physics 10-year review

Recommended action.

The Graduate Council and the Graduate School recommend continuation of the authorization to grant the BS, MS and PhD degrees in Physics. The review committee noted that physics is a strong and successful program and is well recognized on campus. The primary concern raised in the review was the aging of the faculty and the likelihood that faculty numbers will shrink with retirements, under an existing agreement with the Dean of the College of Arts and Sciences. The shrinkage will occur as the college reclaims positions "lent" to the department to hire faculty before existing tenure track lines became available through retirement. Although the department makes a case for retaining their current number of faculty, the Graduate Council was not convinced that the Dean of the College of Arts and Sciences should be pressured to alter the existing agreement. It may be possible to make up some of the loss in faculty numbers by transferring the MS program to Extension (classes are currently offered in the evening) and retaining funding from A&S now associated with this program.

Background

The Department of Physics, which offers BS, MS and PhD degrees, was last reviewed in 1986. The department is strong and well regarded. It is ranked 14th among all US departments by the National Research Council The department graduates approximately 40 BS majors each year, and approximately 10 MS and 25 PhD students. There are approximately 174 BS majors, 40-45 MS students (taking classes offered by the department in the evening) and 130 students in the Ph D program. The department produces about twice the number of majors generally produced in departments of physics. In addition to these students, about 6000 undergraduates per quarter register for 100-level service courses. There are approximately 42 teaching faculty in the department. The department has two unusual programs. The MS degree is largely an outreach program offered to practicing scientists and engineers in the evening. At the time the self-study was prepared, the department was evaluating the advantages of transferring this program to Extension. The second program not generally expected in a department of physics is the Physics Education Group; an NSF funded effort that is a national leader in physics pedagogy. This group conducts research into effective teaching of physics and develops curricula and curricular aids used nationwide in K-12 and the university level. The scientific strengths of the department are

well recognized and are presented in the self-study. The scientific strengths and the outreach effort combine to make a resource of outstanding value to the region and the nation. The self-study, the review committee's report and the department's response are attached.

The historical strength of the department is in nuclear physics, but it has also developed a leading position in atomic physics, astrophysics (in collaboration with astronomy), condensed matter physics, elementary particle physics, and physics education. If they were to receive additional lines, they would be used to:

1. Expand the strength in atomic physics by building a group in the area of neutral atom traps and laser manipulation of atoms and molecules, which would connect well with the Center for Nanotechnology and biotechnology programs at the University.
2 Expand efforts in astrophysics, which would build on strength in Astronomy and the availability of new observational platforms and techniques, as well as strength in the department in gravitational lensing, neutrinos and theory
3. Develop the area of biophysics from the perspective of the physicist, which would link with the existing strengths in the biomedical sciences

Although the department does not identify any of these as a higher priority than the others, each represents an exciting new path that builds on strength in the department and elsewhere on campus.

The educational programs are all in demand and are regarded as strong and healthy by the review committee. The department has strengths in a greater number of areas than is usually found in a department of physics. The PhD program receives approximately 400 applications per year and offers acceptance to 60 students with a yield of 1 in 3. The major limitation is recruitment of outstanding prospects, shared by many programs in the College, due to the paucity of fellowships available to offer. The department is very active in presenting students with career opportunities, sponsoring seminars by returning graduates who have careers outside of academia. Only about 3% of physics PhD students obtain employment in academic institutions nationally (approximately 8% of UW physics PhDs go to universities). The students are satisfied with their career prospects.

The local employment options for BS students is favorable. In addition, graduates of the program are quite successful in obtaining offers from top graduate programs if they choose to continue their formal education. Both majors and non-major undergraduates have the opportunity to participate in faculty research. The department values this interaction. The department plans to initiate a minor in physics to recognize the substantial physics education obtained by students in several majors.

The MS program is of particular utility to the region, as courses are offered in the evening to facilitate the attendance of working scientists and engineers. The MS program is not a feeder to the PhD program, nor does it operate in its shadow. It is a stand-alone program with its own objectives that appears to serve its clients well. In addition to this program aimed at the community, the department also runs a NSF funded 6-week full time summer program aimed at making teachers more effective in physics instruction.

The Physics Education Group is a national model, receiving more than $800,000 from NSF annually Its presence is a very unusual advantage for the state given the paucity of qualified K-12 teachers in physics and the importance of the field in the Washington high-tech economy. The scientific and pedagogical strengths of this department make it a national treasure as well. The state could not hope for a better combination.

The self-study and the report of the review committee list the financial support of the department available through the university as the only significant deficiency. As is often found on campus, salary compression is a serious problem as is underpay. Professors of Physics at the University of Washington receive approximately $20,000 less than their counterparts at peer departments, yet the faculty are regarded as national and international leaders in the field. There is no plan (due to lack of available funds) to replace equipment used for classroom

demonstrations and experiments. Although the department is not in crisis, the lack of a plan will eventually tell. In addition to laboratory equipment, computers are aged and insufficient.

Both the self-study and the review report concentrate on the average age of the faculty, impending retirements and the plan for replacement of retirements. The issue is complicated by an agreement between the department and the Dean of the College of Arts and Sciences from which the department has derived considerable benefit to this point Under the plan, the department has been able to develop a queue of talented faculty supported on soft money from which it has promoted into tenure track positions when these become available. The problem now facing the department (and the College) is that present pressures make it extremely difficult for the Dean to maintain the department at its current strength. Thus, as retirements from tenured positions occur over the next five years, faculty will move from the queue to tenured positions but there will be no opportunity to hire back into the queue as these positions will be reclaimed by the College. This means that faculty numbers will significantly decline (by **three** positions) over the next several years. At the end of this period, assuming no further recapture of positions by the College, the department will have to go on a hiring binge of approximately two faculty per year for approximately the next decade. Since other departments of physics will be turning over at the same time due to the substantial growth in physics nationally in the 1950s and '60s, the competition for outstanding candidates will be fierce. The department requests and the review committee supports an accommodation to allow some hires during the years preceding the year 2002. The graduate council considered this issue and, with a single dissention, felt that the department's present predicament is due to a generosity of which it has been the beneficiary in the past Although clearly it is desirable to maintain the strength of this department, it was felt that no undue pressure should be put on the Dean to alter his arrangement with the department as he copes with his own financial constraints

If faculty numbers decline, the department argues and the review committee agrees that it is likely that both instruction and research will suffer. This department has been the beneficiary of a high standing in the priorities of the College and the University in the past. Both have been repaid by the accomplishments of the department. Transfer of the MS program to Extension is estimated (by the department) to generate approximately 1.5 faculty FTE from that unit. If A&S funding were maintained at the agreed upon rate even in the face of this transfer, the department may be able to retain something close to its current strength.

c: John Simpson, Dean, College of Arts and Sciences
Gary Christian, Associate Dean, College of Arts and Sciences
Debra Friedman, Associate Provost
Stephen Ellis, Chair, Physics
John Slattery, Associate Dean
Graduate School Council
Physics Review Committee