

## Physics

A department in the College of Natural Sciences offering the B.A., B.S., M.S., and Ph.D. in Physics.

### ■ The Review Process

This was a standard AQAD review. Reviewers were:

Raymond Brock (Michigan State University)  
Moses Chan (Pennsylvania State University)  
Susan Coppersmith (University of Wisconsin, Madison)  
Wick Haxton (University of California, Berkeley)

### ■ Main Issues

The Visiting Team offered a combination of positive feedback - especially on recent progress the Department has made in numerous areas - and identification of areas for further improvement. The team commented favorably on the pattern of Departmental hiring over the past eight years, noting that focused searches have helped to bring a “modern outlook” and potential to garner significant external support for its new initiatives; this approach has, however, created a situation in which certain core areas need to be augmented. The team also commented favorably on increased selectivity in the graduate program over recent years, and observed that in general undergraduate majors constitute a “strong group.”

They also, however, highlighted a number of areas of concern. For the graduate program, these included low graduate stipends, a weak graduate curriculum, infrequent colloquia, lack of mechanisms for students to find research groups, recently increased TA workloads, and training for TAs. Concerns with the undergraduate program included retention issues (with losses most severe going into the sophomore and senior years), lack of a meeting space for the Society of Physics Students chapter, outdated teaching laboratories in Hasbrouck, and inadequate math preparation from the Mathematics department. The reviewers also cited several areas of concern at both the graduate and undergraduate levels: negative effects from the restructuring of the machine shop, only modest progress in recruiting women, and little progress in recruiting students from under-represented groups.

The reviewers offered numerous recommendations based on their observations:

#### **Future directions and faculty hiring:**

- Make one to two strong hires in experimental hard condensed matter physics.
- Hire a replacement in particle phenomenology while this area is still seen as a departmental strength.
- Bolster the faculty to support research in the non-accelerator interface.

The team urged the department to construct a five-year plan to exploit the momentum from this hiring plan, and called upon the University to continue to support space renovation and new hire startup packages.

#### **Graduate and undergraduate programs:**

- Act immediately to improve graduate student support: increase stipends, guarantee summer appointments, and avoid assessment of fees.
- Strengthen research area graduate courses and separate graduate and upper-division undergraduate courses that are currently combined.
- Maintain the current number of TA appointments and provide additional positions if the service teaching load continues to grow.
- Institute a weekly colloquium especially for faculty, postdocs, and graduate students.
- Work with Mathematics and possibly other departments to reach agreement about the content of courses relied upon by physics majors.
- Take steps to support and ensure the competitiveness of the NSF REU proposal.
- Drawing from models to be found at peer institutions, improve TA training.
- Support efforts leading to the recruitment of a more diverse student body.

#### **Infrastructure issues:**

- Spatially integrate the Physics department, now split across two main buildings.
- Resolve machine shop issues through such things as a tiered system of rates and subsidies by means of salary support.
- Formulate a campus plan for modern Physics teaching laboratories, starting with the appointment of a faculty “teaching laboratory space czar” and an administrative counterpart.
- Press for upgrades in computing services and support by appointment of a faculty “computing czar.”

#### **Faculty and staff relations, diversity, and mentoring:**

- Hold regular meetings between the Head and junior faculty members, in order to communicate new initiatives, provide a mechanism for faculty to gain recognition for their efforts, and open avenues for support. Hold similar regular meetings with women faculty members.
- Examine the Department’s committee structure with an eye towards efficiency and appropriate representation.
- Bring new staff in sufficiently early to ensure a smooth transition.
- Explore the possibility of faculty members providing peer teaching evaluations.

These recommendations notwithstanding, the Visiting Team’s concluding remarks described the Department as one of “breadth” and “vitality,” marked by a pattern of “outstanding hires” among faculty, and a graduate program that has already seen significant improvements.

### **■ Results of the Review**

In its response and action plans, the Department reported that it is “in full agreement with most of the committee’s findings and recommendations.” The Department reported that it is making efforts towards achieving faculty hires in the areas identified by the reviewers, as well as developing a five-year plan in conjunction with the faculty hiring plan. The Department also noted that the University is undertaking renovations and other improvements on space. For the graduate program, the Department plans to increase stipends for entering students, will increase the number of colloquia beginning in the

2010-11 academic year, and has begun to examine its TA program. For the undergraduate program, the Department has begun a dialogue with the Mathematics department with an eye towards improving physics students' training in math, and has stated its full support of the NSF REU proposal. The Department also plans to augment its recruitment of students from under-represented groups at both the graduate and undergraduate levels. In terms of infrastructure, the Department has appointed an "IT czar," and expressed its full agreement with the reviewers' recommendations for space improvements. Meetings between the Head and junior/women faculty are planned, the committee assignment process is being modified, and the potential for formal or informal peer evaluations is being discussed.

The Dean complemented the Visiting Team for its "thorough evaluation" of the Physics department, commenting on areas in which the Department, College, and University are already underway in addressing identified areas for improvement. He concurred with the reviewer's assessment of the graduate program, supporting the idea of an increase in stipends, curricular review, the hosting of additional colloquia, implementation of TA training, and further recruitment of students from under-represented groups, indicating on the last point that the College should provide support in growing a more diverse student body. He also agreed with the need for infrastructure improvements, offering some suggestions for short-term alleviation of difficulties while long term solutions can be planned.

## ■ Student Outcomes Assessment

The Physics department has developed a set of student learning outcomes for all of its undergraduate majors. They use a number of direct and indirect measures to assess students' attainment of these outcomes including the following:

- Performance in the 440 Intermediate Lab course
- Success in undergraduate research
- Honors thesis capstone presentations
- Senior Survey results
- Department-administered Undergraduate Physics Majors Survey