

Illinois State University
Department of Physics

FY 2016 Budget & Planning Document

Physics FY 2016 Budget & Planning Document

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Summary of FY16 Budget Requests

<i>Budget item</i>	<i>Description</i>	<i>Priority</i>	<i>Type</i>	<i>Duration</i>	<i>Amount</i>
TT faculty	New faculty member in experimental physics	1	Tenure Track Personnel	Permanent	\$68,850
Support staff	New ½ time staff position for storeroom/lab/equipment support	2	Other Personnel (A/P, etc.)	Permanent	\$4,500
Gen Ed lab monitors	Lab monitors for General Education computer lab	3	Tech Tuition/Lab monitors	Temporary One Year	\$11,000
Upgrade computer classroom	Recapitalize computer classroom	4	Tech Tuition /Equipment	Temporary One Year	\$16,268
Fully Fund the Planetarium Director	Fund the Planetarium Director's 10th month from general revenue	5	Other Personnel (A/P, etc.)	Permanent	\$4,588
UTAs	Undergraduate TA's for Physics 105	6	Student Help	Permanent	\$9,000
Student travel	Travel support for undergraduate research conferences	7	Contractual	Temporary One Year	\$5,000
Lab equipment	Advanced and Research lab equipment	8	Equipment	Temporary One Year	\$55,745
URA support	Undergraduate research assistant support	9	Student Help	Temporary One Year	\$6,000
Outreach support	Travel support for Physics on the Road program	10	Contractual	Temporary One Year	\$2,000
Dept. facilities update	Department Office and second floor facilities update	11	Contractual	Temporary One Year	\$44,300
Planetarium facilities upgrade	New star or upgraded projector and digital video projection system	12	Equipment	Temporary One Year	\$35,000 or \$1,500,000

Illinois State University Department of Physics
FY 2016 Budget Planning Narrative
 Daniel Holland 2/2/2015

Section 1. FY 2015 Annual Report

1.1. Accomplishments and productivity for FY15

A. Departmental goals and objectives for FY15

As stated on the Physics Department website, our strategic goals are delineated in our strategic plan and are summarized below.

- Goal 1** ***Maintain a high level of research and scholarship and external funding***
 Maintain a high level of research, scholarship, and external funding. Consistent with our teacher/scholar values, we will continue our tradition of highly productive scholarship, and move toward enhancing our external funding.
- Goal 2** ***Enhance undergraduate research and co-curricular projects***
 Undergraduate research is a primary component of the department's reputation and should continue to grow and mature. Projects-based co-curricular activities have grown significantly in recent years and continued growth is expected.
- Goal 3** ***Expand the computational physics program***
 Consistent with our history and pioneering work in computational physics education, we strive to retain our national advantage.
- Goal 4** ***Further develop the applied physics program, including equipment and the student experience***
 Laboratory science is fundamental both to the advancement of knowledge and scientific applications and to education. This goal entails hiring new experimental physics faculty, updating laboratory curricula and equipment, and improving laboratory-based research.
- Goal 5** ***Strengthen relationships with employers and provide internship opportunities for students***
 Strengthen relationships with employers and provide internship opportunities for students. Such relationships will enhance our applied physics and engineering students' education and improve employment prospects for graduates.
- Goal 6** ***Enhance Undergraduate education and the Physics Teacher Education program***
 This goal envisions both an improvement in pedagogy throughout the curriculum and further enhancements in recruiting faculty and students for the PTE program. The department is already a national leader in PTE and will further cement that leadership position by advancing the program.
- Goal 7** ***Enhance student recruitment and retention***
 National demographics point to fewer college age students in the next decade. Improved recruitment and retention will allow us to better compete for majors.
- Goal 8** ***Strengthen alumni relations and foster giving***
 While we have improved considerably since our previous strategic plan, there is ample room for improvement.
- Goal 9** ***Further develop outreach and public education programs***
 The department has improved significantly in this area in the past decade, and future growth of these programs is planned.
- Goal 10** ***Maintain flexibility and adaptability***
 Flexibility allows us to be able to take advantage of new and unexpected opportunities consistent with our mission and College and University goals.

Specific FY15 Objectives were presented in detail in our FY15 budget proposal and each had at least one associated budget request. FY15 Objectives are summarized below along with their correspondence with Physics, CAS, and Educating Illinois strategic plans.

Notation:PHY = physics, CAS = College, EI = Educating Illinois: GxSy = EI Goal #x and Strategy #y.)

References to the CAS strategic plan are for the 2010-2015 version of that document, while Educating Illinois references are the 2013-2018 document.

Objective 1. Reinvigorate the applied computational and experimental physics programs:

We requested two additional faculty members: an applied computational physicist and an experimental physicist.

Fit to Strategic Plans:

PHY: Goals 2, 3, 4; CAS Goals 1.1, 1.3, 3.1, 4.2; EI: G1S3 G2S1 G2S2 G2S3

Objective 2. New Laboratory Support Position: We continue to be the only physics department in the state without a staff position for introductory lab set-up/take down, classroom demonstration support, storeroom management, equipment repair, assistance in new lab development and co-curricular projects, etc.

Fit to Strategic Plans:

PHY: Goals 1, 2, 4; CAS Goals 1.1, 1.2, 1.3, 1.4, 2.2; EI: G1S3 G2S1

Objective 3. Student assistant support: Our student regular budget has not increased for more than a decade, yet student wages have significantly risen since then. This has required both a cut in the number of hours allocated to students and reallocation of departmental resources.

Fit to Strategic Plans:

PHY: Goals 1, 6, 7; CAS Goals 1.1, 1.2, 1.3, 1.4, 2.2; EI: G1S2 GS3

Objective 4. Laboratory Networking: The MLT 203 and 217 lab rooms are not connected to the internet, making it difficult to share files with student laptops, to find relevant information, and to download files.

Fit to Strategic Plans

PHY: Goals 1, 2, 3, 4; CAS: Goal 1.1, 2.2; EI: G1S2, G1S3, G2S1, G4S2

Objective 5. Undergraduate research support: The department's national reputation is directly tied to our undergraduate research program. We have need for both travel and assistantship support.

Fit to Strategic Plans

PHY: Goals 2, 7; CAS: Goals: 1.1, 1.2, 1.4, 4.2; EI: Goals: G1S1, G1S3, G2S2

Objective 6. Develop Applied Physics infrastructure: We have set in place a long-term initiative to become stronger in applied physics, requiring both equipment and new faculty.

Fit to Strategic Plans

PHY Goals: 1, 2, 4; CAS Goals: 1.2, 1.3, 1.4, 2.2, 3.1, 4.2; EI Goals: G1S3, G2S1

Objective 7. Outreach and Public Education: Enhance the department Physics on the Road program and the ISU Planetarium.

Fit to Strategic Plans

PHY Goals: 9; CAS Goals: 1.2, 4.1, 4.2; EI Goals: G1S1, G1S3, G3S2, G3S4

B. Accomplishment for each FY15 objective

The department received FY14 budget enhancements from Tech Tuition funds, which were used to partially support Objective 3 and 4. Progress was made on other objectives using the department's operating budget, internal reallocation, as well as funds from the College for instructional travel and Sustainability Funds. A summary of progress to date for each objective is given below

Objective 1. Reinvigorate the applied computational and experimental physics programs: *Request for one additional faculty member in applied computational physics approved. We had an international pool of 115 applicant for the position and are currently conducting on campus interviews. The new faculty member is anticipated to start on 8/16/2015.*

Objective 2. New Laboratory Support Position: *The request for a new position was not funded. Variance funds were used to hire a part-time NTT to perform introductory lab set up only.*

Objective 3. Student assistant support: *Tech-tuition lab monitor funds were used for the PHY 102 lab monitors. Variance funds were used to hire undergraduate teaching assistants for other introductory labs. Faculty were still required to teach some introductory labs.*

Objective 4. Laboratory Networking: *Tech-tuition contractual funds were allocated to partially fund this project. Recent installation of a better wireless port in the rooms made the project unnecessary. We plan to use the funds to partially recapitalize our primary computer based teaching classroom where the computers are now six years old.*

Objective 5. Undergraduate research support: *Temporarily, partially met. We received instructional travel funds from CAS which, supplemented with variance funds, supported all student conference travel. Some summer permanent and some summer supplemental funds were used to partially support several summer research students.*

Objective 6. Develop Applied Physics infrastructure: *some progress made. The request for significant equipment purchases was not approved, so the proposed apparatus was not purchased. However, CAS startup funds for our new Assistant Professor will be used to purchase a third 64-core array processor computer, thus enhancing our applied computational physics capability significantly.*

Objective 7. Outreach and Public Education: *The funding requests for this objective included travel and equipment for the Physics on the Road (PoR) program, and two extra months of salary for the Planetarium Director, and new cove lighting for the Planetarium. These requests were not approved. We were able to obtain funding for the cove lighting in the planetarium from the ISU Sustainability Fund. The department has used a small amount of operating budget funds to support the most pressing needs of the PoR program, and the PoR team has received a small amount of income from some of their customers. Planetarium income, supplemented with variance dollars helped extend the Planetarium Directors appointment two months. In addition, we listed a major Planetarium facilities upgrade in order to keep this need on record (which was not approved).*

C. Scholarly accomplishment for FY15

Ongoing general departmental goals include maintenance of our excellent undergraduate student-centered educational programs and productive research programs, both consistent with the *Educating Illinois* and CAS strategic plan core missions. FY15 includes the 2014-2015 academic year, still in progress, so complete data is not available, so calendar year 2014 accomplishments are listed in the table below. This data is from departmental databases, based on faculty productivity reports and other input.

Data requested by CAS:

<i>Accomplishments 2014</i>	<i>Total</i>	<i># with students</i>	<i>#w/international collaborators</i>
Textbooks	0	0	0
Journal articles	19	6	16
Regional/national presentations	11	8	0
International presentations	9	2	2

This represents *an average of about 1.9 journal article per faculty per year*, more than three times the national average of 0.6 for PUI (primarily undergraduate institution) physics and chemistry departments as reported by The Research Corporation.

Other relevant data:

- Invited Presentations:

The department differentiates invited presentations from contributed, valuing invitations as an indication of the faculty member's reputation in the field. For calendar year 2013 we note the following invited presentations:

6 invited conference presentations	in USA, Germany and China
6 invited seminars/colloquia	in USA
12 total invited presentations	

- Undergraduate Student Presentations:

We also separate presentations given by undergraduate students from those on which they are co-authors. In 2013 our undergraduate researchers presented 27 conference talks. With mentoring from 5 faculty members, this represents *an average of 5 student presentations per faculty mentor*.

- New and Continuing External Funding:

<i>Year</i>	<i>Funding Source</i>	<i>Total funds</i>	<i>PI/CoPI</i>	<i>Comments</i>
2014	NSF	\$60,000	Grobe and Su	1 year new funding
2011-2013	NSF	\$300,000	Grobe and Su	3 year grant ongoing
2012-2013	NSF of China	RMB 200,000	Grobe and Su	1 year grant

The \$300,000 NSF grant to our Intense Laser Physics group is the largest ever awarded by the Atomic, Molecular, and Optical Theory RUI program at NSF.

- External Funding Applications:

<i>Year</i>	<i>Funding Source</i>	<i>Total funds</i>	<i>PI/CoPI</i>	<i>Comment</i>
2014	NSF	\$382,388	Grobe and Su	Under Review
2014	ISUE	\$499,587	Rosenblatt	Not Funded
2014	ISUE	\$269,769	Rosenblatt	Not Funded
2014	ISUE	\$300,648	Rosenblatt	Under Review
2014	ACS Petroleum Research Fund	\$70,000	Harris	Under Review
2014	NSF	\$105,855	Harris	Under Review
2014	Fulbright		Rosa	Not Funded
2014	NIH	\$428,250	Rosa/Stein	Under Review

The total submitted funding of \$2,056,497, with \$1,287,141 still under review, is a departmental record.

- Internal URG Funding Applications:

<i>Year</i>	<i>Funding Source</i>	<i>Total funds</i>	<i>PI/CoPI</i>	<i>Comment</i>
2013	NFIG	\$3500	Harris	Funded
2013	FRA	\$3000	Holland	Funded
2014	PFIG	\$3500	Harris	Under Review
2014	SFF	\$10,000	Grobe/Su	Under Review
2014	NFIG	\$3500	Christensen	Under Review
2014	FRA	\$3000	Rosa	Under Review

- Awards and Honors:

<i>Year</i>	<i>Award</i>	<i>Scope</i>	<i>Awardee</i>
2014	Goldwater Scholarship	External	1 student
2015	5+ Club	External	PTE Program
2014	ISAAPT Undergraduate Research Competition 1 st 2 nd and 3 rd place	External	3 students
2014	Brazilian Society of Applied & Computational Mathematics 3 rd place undergraduate research	External	1 student
2014	Fellow of Intercollegiate Biomathematics Alliance	External	1 faculty
2014	Coleman Fellowship (Continuing fellows)	Internal	2 faculty
2014	Bone Scholarship	Internal	1 student

It was a good year for physics as far as awards go.

Other information that the college would like

The following data is also presented for calendar year 2014, or is estimated for a year from partial data. Data is from departmental databases, our website, budget records, and individuals responsible for the item.

Editorships: None

Notable invited public lectures/interviews on academic topics by faculty members, staff, and students

- Public education and outreach

The department has two active public education programs and some of our other programs perform outreach also. A summary is given below.

ISU Planetarium: Approximately 73 public shows, 58 school shows, reaching an audience of 3339 individuals. Several Radio/Television interviews.

Physics on the Road: Approximately 116 school and public physics demonstrations, reaching 6819 students

Uncommon Knowledge ; 4 WGLT radio shows/podcasts

Solar Car Team: multiple events displaying the car and presenting solar energy talks, ISU marketing video featuring the solar car race in Texas, multiple articles in Pantagraph featuring the team.

Expanding Your Horizons 1 event per year, bringing middle school age girls to campus to learn

about Science Math and Technology related professions. Approximately 200 attendees.

Counting each event listed above gives a total of more than 250 public education events reaching an audience in excess of 10,000. Details of each are available upon request.

• **Co-curricular activities**

Here is a summary of the 8 types of co-curricular activities available for students in the physics department:

- 1 Public education and outreach
- 2 ISU Physics Club (affiliated with national Society of Physics Students)
- 3 ISU Astronomy Club
- 4 Sigma Pi Sigma national physics honor society
- 5 Undergraduate research participation
- 6 Solar Car Team
- 7 Trebuchet team
- 8 Innovative Design Project

More information on these activities will be made available upon request.

Describe student participation in student exchanges and study abroad.

The Solar Car Team took 11 students to Abu Dhabi for two weeks to participate in the Abu Dhabi Solar Challenge and the World Future Energy Summit.

D. Productivity Measures for FY15

PRP Accountability Reports

Credit Hours Generated by Physics

The Fall 2014 data is not available as of yet on the Physics The Planning, Research and Policy (PRP) website but looking at the Fall 2013-Spring 2014 academic year we obtain the following:

Total undergraduate credit hours generated by our T/TT faculty: 6701

Undergraduate credit hours generated per T/TT/FTE: 558.4

This includes courses taught by 12 FTE T/TT

For comparison, The total undergraduate credit hours generated by CAS T/TT faculty: 132489

Undergraduate credit hours generated per T/TT/FTE: 414.6

This includes courses taught by 319.5 FTE T/TT

Total undergraduate credit hours generated by our NTT faculty: 1068

Undergraduate credit hours generated per NTT/FTE: 1335

This includes courses taught by 0.8 FTE NTT

For comparison, The total undergraduate credit hours generated by CAS NTT faculty: 95453

Undergraduate credit hours generated per NTT/FTE: 887.5

This includes courses taught by 107.6 FTE NTT

For this data I have used the average FTE for the year encompassed for each group. It is worth

noting that physics department's credit hours per FTE are in line with, but higher than the college averages. The fall 2014 data will be interesting for next year's report since we had three retirements and a sabbatical for the 2014/15 academic year. Thus we needed to rely heavily on NTTs to meet our class schedule.

American Institute of Physics Statistical Research Center Report

The AIP reports physics degrees biennially, using a 3-year average. The most recent data is from 2010, covering the years 2008-2010. The report includes a table of "Bachelor's-only departments averaging 10 or more physics bachelor's degrees per year". Note that most physics departments average fewer than 10 graduates per year. See

<http://www.aip.org/sites/default/files/statistics/undergrad/bachdegrees-p-10.pdf>.

The ISU Physics Department, with a 3-year average of 17 graduates, ranks 8th in the nation (there are about 550 such departments). The table below shows the average number of graduates produced by the top departments in the most recent study.

<i>Rank</i>	<i>Physics Department</i>	<i>Graduates</i>
1	U.S. Naval Academy	31
2	SUNY Geneseo	26
3	U. Wisconsin, La Crosse	23
4	Western Washington U.	22
5	Harvey Mudd College, Loyola University (Chicago)	21
6	Bethel U., Carleton College, Reed College, U.S. Air Force Academy	19
7	Murray State U.	18
8	Illinois State University, Grinnell College, James Madison U.	17

Our numbers have remained similar, averaging about 17 per year for many years, always placing us in the top ten nationally.

1.2. Internal Reallocations in FY14

A. Reallocations and reorganizations in FY14

The Physics Department is small and flexible. We do not have a complex administrative structure, so reorganizations would be very rare. We did move some funds from one object code to another to account for specific departmental needs. A detailed accounting is available upon request.

B. Use of additional funds to enhance accomplishments and productivity

B.1. Enhancement funds

The department received no Provost Enhancement funds in FY13 or in FY14.

B.2. SBC Accountability Report

The department requested and received \$2700 in SBC that were used for student help.

B.3. Variance funds

The department has some "permanent variance" (NTT base) and temporary variance funds in FY15 from three sources: 50% of Prof. Holland's salary (he is on a full year sabbatical) and \$8,000 toward Prof. Rutherford's salary (as Associate Director of CeMaST). The physics FY15 variance plan, originally submitted to CAS last Fall, is included as Appendix 1 of this document. FY15 Variance funding includes the following:

1. Support for an NTT faculty member to cover courses freed up by Dr. Martin, and Dr. Rutherford's release time.
2. Support for introductory laboratory set-up and take down (NTT base permanent variance).
3. Support for 1 month per year of the Planetarium Director's salary to bring him to his 10 month contract.
4. Support for a shortfall in our Instructional capacity funding for an NTT faculty member to teach PHY 102.
5. Support for Undergraduate Teaching Assistants (UTAs) beyond base budgeted funds and CAS enhancement.
6. Support for summer research stipends for undergraduate researchers.
7. Expenses for campus visits for faculty search candidates.
8. Expenses for upgrading student tutoring room.

B.4. Technology tuition dollars

The department received tech tuition funds for Student lab monitors for the PHY 102 open lab in FY15. This is our Inner Core Gen Ed class which usually serves about 580 students per semester.

B.5. Summer session funding

Summer school: summer session 2013 funds supported two Gen Ed classroom physics courses, PHY 105 and PHY 108, as well as the online version of PHY 207. All of these courses are also service courses to several other majors.

Other summer funds: We received limited funds to support undergraduate researchers. We used our summer permanent funds and some variance to support both undergraduate research stipends and a few faculty curricular projects last summer.

B.6. External funding

Grant funding supports specific research projects (see Section 1.C above for a summary of grants). The ongoing Intense Laser Physics unit's NSF grant partially supported their visiting scholar, as well as summer salary for the PI and co-PI.

Grant indirect costs from the Intense Laser Physics unit's NSF grant supported the department's matching support of their post-doctoral researcher.

B.7. Foundation funds

Most physics Foundation accounts are for specific purposes such as scholarships, awards, research support for women faculty, the ISU Solar Car, *etc.* Limited flexible funds were used to support award dinners, alumni expenses, and student projects.

B.8. External contracts

The department has no contracts in FY15.

B.9. Agency funds

The department receives income to Agency accounts from three sources:

1. Admission and gift shop revenue from the Planetarium. Most of these funds are used to cover the Planetarium Director's salary in the summer, while the remainder is used for Planetarium maintenance and gift shop inventory.
2. Royalties on faculty-authored lab manuals. These funds are used mainly for lab costs not covered by lab fees and to support printing needs and other commodities needs for students in physics courses.
3. Grant indirect costs. Currently, these funds are mainly from the Intense Laser Physics unit's NSF grant (see above). These funds supported the department's matching funding for of their post-doctoral researcher.

1.3. Accountability Reports for FY15

A. Instructional capacity accountability report

The physics department received \$52,890.80 in IC funds for FY15. When combine with the Permanent variance of \$35,803 this covered most of the required courses, with a shortfall of \$4,391, which was paid for with variance funds. This does not include summer lab support or summer funding for the planetarium director.

Faculty	Course	Cost/sem
Clark	207 F	\$8,775.00
Holbrook	2 STS	\$2,340.00
Hassani	240 F	\$8,775.00
Wenning	102A F	\$8,775.00
Zich	102A F	\$7,855.00
Zich	102B F	\$5,881.00
Zich	lab support	\$7,885.00
Clark	102 A S	\$8,775.00
Holbrook	105 S	\$6,000.00
Tripathi	355 S	\$4,500.00
Zich	102 B S	\$5,881.00
Zich	102B S	\$5,881.00
Zich	207	\$5881.00
Zich	Lab support	\$5881.00

Total NTT Budget for FY15: \$93,085

B. Supplemental travel for field supervision accountability report

The department received \$5,000 for student teacher supervision. So far we used only \$2514 for fall with an anticipated expenditure in the spring of \$3000. This leaves a shortfall of about \$500.

Section2. FY16 Planning Document

Objective 1.Reinvigorate the experimental physics programs: Faculty retirements last year will leave the department short in expertise in experimental physics. Since physics is at its core an experimental discipline, we need new people and fresh ideas to bring our applied physics program into the next phase.

Fit to Strategic Plans

Department Plan:

- Goal 1. Maintain a high level of research and scholarship.
- Goal 2. Enhance undergraduate research and co-curricular projects.
- Goal 4. Further develop the Applied Physics program.

CAS Plan:

- Goal 1.1: Develop and maintain rigorous academic curricula.
- Goal 1.3: Enhance support for faculty research and creative activity
- Goal 3.1: Increase funding from external research grants and contracts.
- Goal 4.2: Promote the local, state, national, and international visibility of the College's programs, student successes, and faculty and staff achievement.

Educating Illinois Plan:

- Goal 1: Provide a supportive and student-centered educational experience for high-achieving ,diverse and motivated students that promotes their success.
 - Strategy 3 Increase opportunities for students to engage in high-quality, high-impact educational experience
- Goal 2: Provide rigorous, innovative, and high-impact undergraduate and graduate programs that prepare students to excel in a globally competitive, culturally diverse, and changing environment
 - Strategy 1: Enhance and support rigorous and innovative undergraduate and graduate program.
 - Strategy 2: Promote sustainable, mission-consistent growth in the research enterprise.
 - Strategy 3: Recruit and retain high-quality, diverse faculty and staff.

Objective 2.New Laboratory Support Position: We propose a new staff position to oversee the physics storeroom equipment, maintenance, and acquisitions and to assist faculty with demonstrations and development of lab apparatus. The new position will have a physics degree requirement for enhanced functionality in lab development and pedagogy at all levels.

Fit to Strategic Plans:

Department Plan:

- Goal 1. Maintain a high level of research and scholarship.
- Goal 2. Enhance undergraduate research and co-curricular projects.
- Goal 4. Further develop the Applied Physics program.

CAS Plan:

- Goal 1.1: Develop and maintain rigorous academic curricula.
- Goal 1.2: Enhance opportunities for co-curricular learning activities
- Goal 1.3: Enhance support for faculty research and creative activity
- Goal 1.4: Enhance and encourage support for student research and creative activity

Goal 2.2: Continue to develop and maintain technology infrastructure and professional staff to support scholarship, creative activity, and student learning

Educating Illinois Plan:

Goal 1: Provide a supportive and student-centered educational experience for high-achieving, diverse and motivated students that promotes their success.

Strategy 3 Increase opportunities for students to engage in high-quality, high-impact educational experience

Goal 2: Provide rigorous, innovative, and high-impact undergraduate and graduate programs that prepare students to excel in a globally competitive, culturally diverse, and changing environment

Strategy 1: Enhance and support rigorous and innovative undergraduate and graduate programs.

Objective 3. Student assistant support: The department hires undergraduates as Gen Ed lab monitors, UTAs, and office assistants. Our student regular budget has not increased for more than a decade, yet student hourly wages have grown significantly, resulting in fewer hours available for student assistants. The slack must be taken up by faculty and staff.

Fit to Strategic Plans

Department Plan:

Goal 1. Maintain a high level of research and scholarship.

Goal 6. Enhance Undergraduate education and the Physics Teacher Education program.

Goal 7. Enhance student recruitment and retention.

CAS Plan:

Goal 1.1: Develop and maintain rigorous academic curricula.

Goal 1.2 Enhance opportunities for co-curricular learning activities.

Goal 1.3: Enhance support for faculty research and creative activity

Goal 4.2: Increase the local, state, national, and international visibility of the college's quality programs, student successes, and faculty and staff achievements.

Educating Illinois Plan:

Goal 1: Provide a supportive and student-centered educational experience for high-achieving, diverse and motivated students that promotes their success.

Strategy 1: Recruit, enroll and retain high-achieving, diverse, and motivated students

Strategy 3: Increase opportunities for students to engage in high-quality, high-impact educational experience

Objective 4. Recapitalize Computer Teaching Classroom: The computers in MLT 309 were purchased in 2008 and are beginning to have problems running the new operating systems and programs. This is our highest priority to upgrade since this classroom is utilized on a regular basis by all physics majors, as well as students in some Gen Ed courses

Fit to Strategic Plans

Department Plan:

Goal 1: Maintain a high level of research and scholarship (after-hours the computers become part of the department's parallel grid supercomputer system)

Goal 2: Enhance undergraduate research and co-curricular projects.

Goal 6: Enhance Undergraduate education and the Physics Teacher Education program.

Goal 7: Enhance student recruitment and retention

CAS Plan:

Goal 1.1: Develop and maintain rigorous academic curricula.

Goal 2.2: Continue to develop and maintain technology infrastructure and professional staff to support scholarship, creative activity, and student learning.

Educating Illinois Plan:

Goal 1: Provide a supportive and student-centered educational experience for high-achieving, diverse and motivated students that promotes their success.

Strategy 1: Recruit, enroll and retain high-achieving, diverse, and motivated students

Strategy 3: Increase opportunities for students to engage in high-quality, high-impact educational experience

Goal 2: Provide rigorous, innovative, and high-impact undergraduate and graduate programs that prepare students to excel in a globally competitive, culturally diverse, and changing environment

Strategy 1: Enhance and support rigorous and innovative undergraduate and graduate programs.

Objective 5. Undergraduate research support: The department's national reputation is directly tied to our undergraduate research program. We have need funds for both travel and assistantship support.

Fit to Strategic Plans

Department Plan:

Goal 2: Enhance undergraduate Research and co-curricular projects.

Goal 7: Enhance student recruitment and retention

CAS Plan:

Goal 1.1: Develop and maintain rigorous academic curricula.

Goal 1.2: Enhance opportunities for co-curricular learning activities.

Goal 1.4: Enhance and encourage support for student research and creative activity

Goal 4.2: Promote the local, state, national, and international visibility of the College's programs, student successes, and faculty and staff achievement.

Educating Illinois Plan:

Goal 1: Provide a supportive and student-centered educational experience for high-achieving, diverse and motivated students that promotes their success.

Strategy 1: Recruit, enroll and retain high-achieving, diverse, and motivated students

Strategy 3: Increase opportunities for students to engage in high-quality, high-impact educational experience

Objective 6. Develop Applied Physics infrastructure: We have set in place a long-term initiative to become stronger in applied physics and have begun to move in that direction. To be successful, both equipment and new faculty are necessary to continue that movement.

Fit to Strategic Plans

Department Plan:

- Goal 1. Maintain a high level of research and scholarship.
- Goal 2. Enhance undergraduate research and co-curricular projects.
- Goal 4. Further develop the applied physics program, including equipment and the student experience

CAS Plan:

- Goal 1.1: Develop and maintain rigorous academic curricula.
- Goal 1.2: Enhance opportunities for co-curricular learning activities.
- Goal 1.3: Enhance support for faculty research and creative activity.
- Goal 1.4: Enhance and encourage support for student research and creative activity.
- Goal 2.2: Continue to develop and maintain technology infrastructure and professional staff to support scholarship, creative activity, and student learning.
- Goal 3.1: Increase funding from external research grants and contracts.
- Goal 4.2: Promote the local, state, national, and international visibility of the College's programs, student successes, and faculty and staff achievement.

Educating Illinois Plan

- Goal 1: Provide a supportive and student-centered educational experience for high-achieving, diverse and motivated students that promotes their success.
 - Strategy 1: Recruit, enroll and retain high-achieving, diverse, and motivated students
 - Strategy 3: Increase opportunities for students to engage in high-quality, high-impact educational experience
- Goal 2: Provide rigorous, innovative, and high-impact undergraduate and graduate programs that prepare students to excel in a globally competitive, culturally diverse, and changing environment
 - Strategy 1: Enhance and support rigorous and innovative undergraduate and graduate programs.

Objective 7. Outreach and Public Education: Initiated by grant support, the department's Physics on the Road program has made great strides in bringing the fun of physics to school children in K-12 grades. To stabilize and grow this new program, support is necessary. Our Planetarium is a campus landmark and has been a major university outreach program for 50 years. To survive in the digital age, the Planetarium needs a major facilities upgrade.

Fit to Strategic Plans

Department Plan:

- Goal 6: Enhance Undergraduate education and the Physics Teacher Education
- Goal 9: Further develop outreach and public education programs

CAS Plan:

- Goal 1.2: Enhance opportunities for co-curricular learning activities.
- Goal 4.1: Increase mission-consistent outreach and partnerships with our on-campus and community constituencies.
- Goal 4.2: Promote the local, state, national, and international visibility of the

College's programs, student successes, and faculty and staff achievement.

Educating Illinois Plan:

Goal 3: Foster an engaged community and enhance the University's outreach and partnerships both internally and externally.

Strategy 2: Increase pride, engagement, and sense of community among University stakeholders.

Strategy 4: Advance the University's reputation through initiatives that promote the mission of the institution

Our prioritized FY16 budget requests, summarizing details and justifications, are presented in Sections 2.2 -2.5 below. A short, 1-2 page, discussion and justification of each request is given. Each request has a summary of its strategic planning fit. More details regarding fit to the three strategic plans are given in this Section 2.1 (above), with abbreviations defined in Section 1A.

2.2. Personnel Requests: New Tenure Track Faculty

We have had three retirements last year along with two more in the past couple years and we are very appreciative of the three faculty positions approved for physics, the third of which is currently in the final stages of the interview process. Of the three retirements in the past year, one is a mathematical physicist with expertise in quantum field theory, one is a computational physicist with expertise in statistical mechanics, and the third is an experimental physicist with expertise in atomic and molecular physics. Since this year's new hire is in the area of computational physics, we are requesting one positions to enhance our expertise in experimental physics.

Priority 1 Request: Tenure-track faculty in experimental physics

FY16 Objective 1

Fit to Strategic Plans: PHY: Goals 1, 2, 4; CAS: Goals 1.1, 1.3, 3.1, 4.2; EI: G1S3, G2S1, G2S3, G2S3

Personnel, permanent \$68,850

1. *Explanation of the Request and justification*

The department is requesting one position, to be searched in FY16, in the general area of experimental physics. Our reasoning follows.

Rationale 1: Expertise in laboratory physics

The ISU physics department currently has two faculty who were hired as laboratory experimental physicists. A third retired in 2014.

A few examples of the importance of this program to the department and the College are itemized here.

- a. At its core, all of physics must agree with experimental evidence. While the department specializes in computational research, it is essential to have a high level of competency in experimental physics.
- b. Our advanced laboratory courses PHY 270 and 370, as well as the electronics course

PHY 375, require teachers who are experienced in laboratory methods, data analysis, and instrumentation.

- c. While our departmental research "specialty" is computational physics, there are always students who seek hands-on laboratory research experiences. The department needs expert experimentalists to effectively mentor those students.
- d. Besides research mentoring, laboratory physics faculty have also served as mentors for the ISU solar car team, the Physics Club trebuchet, and the Innovative Design Project. Without experienced faculty, these programs simply could not exist.
- e. Introductory courses for physics majors, service courses for other majors, and general education courses all have laboratory exercises associated with them. While any good physicist could teach these introductory labs, it is usually the laboratory experimentalist faculty who develop new labs and update old ones.

Rationale 2: Physics strategic goals

Hiring a faculty member in the general area of applied experimental physics furthers three of the department's strategic goals:

Goal 1. *Maintain a high level of research and scholarship.*

Goal 2. *Enhance undergraduate research and co-curricular projects.*

Goal 4. *Further develop the applied physics program, including equipment and the student experience*

An effective way to maintain our high levels of research (Goal #1) and undergraduate research mentorship (Goal # 2) for students not interested in computational physics is to focus a new position in the laboratory experimental area. Selecting experimentalist with research in an applied field (like one likely FY 2014 retirees) will also advance strategic goal #4 and will fit well into expected future directions in applied physics research. Moreover, the department has long had a vision of developing a major sequence in applied physics, which would be impossible without a critical mass of laboratory physicists

Rationale 3: Trends in the physics community

Experimental physics is hardly a trend. It is crucial to the scientific method and it keeps the theoreticians and computer modelers focused on explaining the "real" world. However, the growing subfields such as:

- a. *Biophysics*
- b. *Nanoscience and nanotechnology*
- c. *Quantum information and quantum computing*

can yield innovative experiments, many of which would be feasible in a small lab. The department already has two faculty with projects in the thriving area of biophysics (neurophysics, laser bio-imaging, and an ongoing collaboration with the School of Biological Sciences) and one in experimental nanotechnology (energy conversion devices), and a new collaborator in either of those areas could benefit our research productivity. Similarly, our laser physics group is doing some

fundamental work that relates to quantum information, and an experimental colleague could work well with them. All three areas have the potential for significant external funding, especially the first two, and all of these fields have demonstrated interest for undergraduates.

Rationale 4: Teaching needs

After assigning the new FY15 faculty member's expected courses, and considering the expected retirements, the department is left with gaps in covering the following courses:

- a. *PHY 102: Gen Ed (3 sections per year)*
- b. *PHY 206: Gen Ed (2 sections per year)*
- c. *PHY 111: Physics for scientists and engineers II (1 sections per year)*
- d. *PHY 320: Advanced Mechanics (1 section every other year)*
- e. *PHY 3XX: Advanced Physics Elective (1 section per year)*

The 300 level courses are not generally taught by NTT faculty. The department has begun introducing more active-engagement teaching methods into the 100 level and prefer to have T/TT faculty leading this change, especially in PHY

These courses add up to a total of 24 semester hours. The department likes to offer new faculty a teaching assignment of 6-7 hours per semester while they initiate their research programs, but 24 hours per year can be covered by a new faculty member with some additional help with NTT faculty.

2. Budget and justification

Salary

This salary is based on a projected 2% increase in the salary allocated to our search for this year, which in turn is based on data from the American Institute of Physics for 2006 (the most recent data available and accounting for a minimal 2% per year raise since then, we estimate a typical fall 2015 salary in the range \$65,825 to \$84,110. We request \$68,850, toward the *low end* of this range, but in line with the average for the University for Assistant Professors.

Startup funds

For a laboratory experimentalist, startup funds can be substantial. The department would be looking for someone who performs "tabletop" experiments, requiring fewer expensive apparatus items. But, we expect any experimentalist to need at least one significant piece of equipment, costing more than \$100,000. The new person would also be expected to propose for external funds to help pay for the new lab. If approved, the department will work closely with the College and Provost's office on this issue.

2.3. Personnel Requests: New Tenure Track Faculty Other – *Non-reappointment, tenure-denial, or death (PERS 936b)*

None.

2.4. Strategic Budgeted Carryover (SBC) Requests ONLY (PERS 937 spreadsheet)

The physics department has \$5000 SBC requests for FY15.

2.5 Temporary/Permanent Enhancement Fund Requests

We first provide a summary of requests, then more details about each request. Priorities listed indicate overall priority considering all FY16 requests.

Temporary funds requests

Priority 3	<i>Gen Ed lab monitors</i>	Tech-tuition/lab monitors	\$11,000
Priority 4	<i>Recapitalize computer classroom</i>	Tech-tuition/contractual	\$16,500
Priority 8	<i>Travel support for undergraduate research conferences</i>	Contractual and travel	\$5,000
Priority 9	<i>Student Teacher supervision Travel</i>	Travel	\$7,000
Priority 10	<i>Advanced and Research Lab Equipment</i>	Equipment, temporary	\$71,650
Priority 11	<i>Student research support: URAs</i>	Student help	\$6,000
Priority 12	<i>Physics Outreach Support for Physics on the Road</i>	Contractual and travel	\$2,000
Priority 13	<i>Department Office and second floor facilities update</i>	Contractual	\$40,000
Priority 14	<i>Planetarium facilities upgrade</i>	Contractual and equipment	\$35,000 or \$1,500,000

Permanent funds requests

Priority 2	<i>New 1/2 time staff position for lab/equipment support</i>	AP or Civil Service	\$
Priority 6	<i>Fully Fund the Planetarium Director</i>	Personnel funds	\$4,588
Priority 7	<i>Student Help</i>	Contractual and travel	\$9,000
Priority 15	<i>New 1/2 time staff position for advising students</i>	AP or Civil Service	\$21,000

2.5.A. Descriptions of temporary funds requests

Priority 3 Request: Gen Ed lab monitors

FY16 Objective 3

Fit to Strategic Plans:

PHY: Goals 1, 6; CAS: Goals 1.1, 1.3; EI: G1S1, G2S2

Student help, tech-tuition funds, *temporary* \$11,000

1. Explanation of the Request and justification

The department's Undergraduate Teaching Assistant (UTA) program has been successfully recruiting students with sufficiently good records to assist in proctoring, grading, and, for those with the experience and desire, teaching Gen Ed and introductory physics labs. The program offers valuable experience to students, particularly PTE majors, assists our students with financial need, and allows the department to better focus faculty expertise onto more productive activities. In particular, lab monitors to staff the open lab for PHY 102 are always in demand and not covered in our annual student help budget. The state and national minimum wage has been increasing and the Illinois minimum wage increased again to \$8.25 in July 2010. Our student regular budget has only increased slightly for those few students who earn the minimum wage, and otherwise not at all, at least since 2000 when the current department Chair took the position. The department pays about \$1.00 above minimum in order to compete for students, who can often earn more off campus, so we will be paying \$9.25 per hour in FY16. The PHY 102 lab is open Tuesday through Friday during work hours and requires at least one monitor at all times. Because of lack of funds to pay student monitors we have reduced the open hours for this lab down to 24 per week and have had to assign faculty and department staff to some monitoring hours even then. Even at this minimal service level, our costs for 102 TAs alone is \$14,000 per academic year. We are requesting \$11,000 to help defray the cost associated with this course. The department will cover additional costs from its student regular budget.

2. Expected Outcomes

The following outcomes are proposed

- Fully staff the PHY 102 open computer/experimental lab with student monitors
- Allow more flexible staffing of other lab UTAs, since the PHY 102 open lab can fit TAs who would otherwise have scheduling conflicts.
- Allow faculty to teach lectures and do research, rather than be assigned to lab monitor duty

3. Budget and budget justification

The UTA expenditures for this course are approximately \$14,000 per academic year. The Regular Student budget has not changed in more than a decade and is approximately \$24,500 per year, thus PHY 102 alone uses more than half of our budget. We request \$11,000 Tech Tuition Funds to offset the increased expense of this course. The remaining amount will be supported as part of our Regular Student budget which also covers the rest of our undergraduate labs.

Priority 4 Request: Recapitalize computers in MLT 309**Objective 4*****Fit to Strategic Plans:***

PHY: Goal 4; CAS: Goals 1.1, 2.2; EI: G1S5, G2S2, G2S3

Tech tuition/contractual, temporary \$16,268***1. Explanation of the Request and justification***

MLT 309 is the primary computer classroom in the department and is used by all physics majors and several general education courses. The computers in the room were purchased in January of 2008 (seven years ago) and are nearing obsolescence. They are having difficulty running the latest versions of the Apple operating system due to the limited amount of memory and the older processors.

2. Expected outcomes

The following outcomes are proposed

- The students will be able to run the latest versions of our software and will be able to take advantage of the University's site license of Mathematic for in-class projects
- When not in use, the processors can be networked and will become available to faculty for running large scale computer simulations.

3. Budget and budget justification

This request fits well under Tech Tuition funds since this is the primary computer teaching classroom for the department.

In FY15, the department received \$8,500 in tech tuition dollars to network two of our undergraduate labs. Due to improved wireless connectivity, that project was unnecessary so the money will be used to partially recapitalize MLT 309. There are 16 computers in the course with a cost of \$1548 each (including AppleCare protection) for a total cost of \$24,768. Subtracting out FY15 funds of \$8,500, this leaves a balance of \$16,268.

Priority 7 Request: Travel support for undergraduate research conferences

FY16 Objective 5

Fit to Strategic Plans:

PHY: Goal 2; CAS: Goals 1.2-1.4, 4.2; EI: G1S1, G1S3

Contractual and travel funds, temporary \$5,000

1. Explanation of the Request and justification

These funds are used in concert with existing department funds to pay expenses for students to travel to conferences, especially the Argonne Symposium for Undergraduate Research and the Prairie Section of the American Physical Society meeting (PSAPS), to present results of their research. In recent years about 12-15 physics students per year presented talks at these two conferences. Such presentation is a formative experience for our young researchers, many of whom go on to present at national conferences and to co-author journal articles.

The consortium of Central States Universities, Inc. (CSUI) has supported registrations and housing for Argonne Symposium student presenters and mentors. This requires membership in CSUI, which RSP had supported until 2010. In recent years, several departments and CeMaST have chipped in to pay CSUI dues. Our request will not assume this, but the need will be less if the funds for membership can be raised. With sufficient support the department would be able to have a presence at other conferences: a national conference on undergraduate research, the NCUR conference (<http://www.ncur.org>) sponsored by the Council on Undergraduate Research; and the ISAAPT (Illinois Section of the American Association of Physics Teachers) spring meeting, which has a student research competition. In the past, ISU physics students have captured many ISAAPT awards and we would like to enhance our participation in this meeting by fully paying expenses – covered in the past by the students themselves and their faculty mentors.

2. Expected outcomes

The following outcomes are proposed

- Allow up to 12 students and their faculty mentors to attend the Argonne Symposium for Undergraduate Research in Science, Mathematics, and Engineering in fall of 2016.
- Allow up to 10 students and their faculty mentors to attend the PSAPS meeting in fall of 2016.
- Allow up to 10 students and their faculty mentors to attend the ISAAPT meeting in the spring of 2017.
- Allow a limited number of students to attend a national undergraduate research conference, the NCUR Conference, in June of each year.

3. Budget and budget justification

Travel to the Argonne Symposium includes a university van plus fuel, as well as mileage costs for some drivers; estimates of \$25 below represent a conservative estimate of averaged costs. Overnight lodging assumes double occupancy for students and single occupancy for faculty. Meals are ISU per diem rates for Chicago. Thus, the estimated totals for 12 students and 4 mentors are summarized in the table below:

<i>Item</i>	<i>Cost per person</i>	<i>for 12 students</i>	<i>for 4 mentors</i>	<i>total</i>
Meals	\$32	\$384	\$128	\$512
Travel	\$25 \$60 \$100	\$300 \$720 \$600	\$100 \$240	\$400 \$960
Registration			\$400	\$1000
Lodging				
Totals		\$2,004	\$868	\$2,872

Similar expenses for the PSAPS conference, with a lower registration fee of \$20, yield a total of \$1,800 for 10 students and 3 mentors. The grand total is then \$4,672. Our request of \$5,000 includes (very) limited support for the ISAAPT and NCUR conferences to supplement departmental support. This request would be *reduced by about \$1,960* if ISU retains membership in CSUI.

Priority 8 Request: Advanced and Research Lab Equipment**FY15****Objective 6****Fit to Strategic Plans:**

PHY: Goals 1, 2, 4; CAS: Goals 1.1, 1.3, 1.4, 2.2; EI: G1S5, G2S1, G2S2, G2S3

Equipment, temporary \$55,745**1. Explanation of the Request and justification**

The department's strategic plan includes enhancement of its applied physics infrastructure. This request will *update equipment for our experimental courses*: advanced lab (PHY270 and PHY 370) and electronics (PHY 375), with an eye toward double-duty in new instrumentation courses to be developed in the future. This will assure our students will have state-of-the-art apparatus and measurement instrumentation, to prepare them for in and out of class research projects, and for their future. Our strategy is to update progressively. In previous years we have added a few new items for these labs (the most recent being in FY11). We have identified one large piece and one medium piece of equipment that meets our strategic needs, can be used for a variety of projects in the labs, and can also be used in research:

Surface mount technology (SMT) for circuit boards. As electronic components become increasingly miniaturized, manufacturers are turning to SMT to replace the older through-hole technology on printed circuit boards. Since SMT soldering requires placement of tiny components whose pins are separated by fractions of a millimeter, these boards are very difficult to produce without precision equipment. To ensure that our students keep up with this important shift in a broadly applicable area, we would like to add the capability to produce SMT prototype boards in our upper division laboratory curriculum.

Cube pro 3D printer. It has a build area of 10" x 11" x 9" tall. It can print in ABS and Nylon so it could make very durable parts for prototyping parts

Both pieces of equipment will also be used for the Innovative Design Project, the Solar Car Team and in various research projects.

2. Expected outcomes

The following outcomes are proposed

- Continue to lay the ground work for an applied physics concentration, and for any potential graduate program (see the department's strategic plan)
- Students will learn many instrumentation skills and basic measurement techniques with these state-of-the-art systems.

3. Budget and budget justification

The quoted price of the SMT system is \$46,045 from LPKF, a standard vendor of such devices. The Cube Pro 3-D printer sells for \$3100. An additional \$6,600 is needed for a repair station, for a total of \$55,745.

As usual, the department is willing to work to accommodate available funds.

Priority 9 Request: Student research support: URAs*FY15 Objective 5****Fit to Strategic Plans:***

PHY: Goal 2; CAS: Goals 1.1-1.4, 4.2; EI: G1S1, G1S3, G2S1, G3S4

Student help, temporary \$6,000***1. Explanation of the Request and justification***

The physics department's national reputation is tied to our teacher-scholar tradition, which highly values undergraduate involvement in research. Department faculty spend significant time mentoring students in projects at the forefront of their research fields and many students make noteworthy contributions. In addition, students learn that doing physics is different than taking a class in physics. They learn how to develop techniques to solve unsolved problems, how to collaborate in small groups, and how to communicate their research results to the community. The physics department is committed to this alternative learning experience for our students.

Unfortunately, good students are frequently prevented from taking full advantage of these research opportunities because of financial need. Rather than work on an exciting physics project, they need to work at a low-level job just to make ends meet, pay tuition, *etc.* Department faculty stretch grant funds as far as they can to help support undergraduate research assistants (URAs), the department uses limited summer funds to help, and occasional Honors Research Mentorships help as well, but the fact is that our research participation during summers has decreased in recent years. In summer 2009, fewer than 5 students were actively working on research projects. We request funds to provide stipends for URAs doing research projects.

2. Expected outcomes

The following outcomes are proposed

- More undergraduate students participating in research
- More measurable outcomes from that participation: student presentations, co-authored talks, and journal article co-authorships
- Students earning money for scientific research instead of waiting tables, *etc.*
- Stronger undergraduate records that will spawn better jobs and graduate school acceptances.

3. Budget and budget justification

Ideally we would pay a competitive wage, which we suggest as the same rate as for our UTAs: \$9.25 per hour (\$1 above minimum wage). For a semester project at 10 hours per week for 4.5 months, this totals about \$1,665 per semester. Thus two semester-long URAs would cost \$3,330. A summer stipend for 2 months at 37 hours per week would be \$2,738. Thus to support an average of one student for a year the total cost would be \$6,068. The department will continue to fund further URA time from grants, Honors Mentorships, summer personnel funds, and Foundation account funds.

Priority 10 Request: Physics Outreach Support for Physics on the Road FY15 Objective 7
Fit to Strategic Plans: PHY: Goals 9; CAS: Goals 1.2, 4.1, 4.2; EI: G3S2, G3S4

Contractual and travel funds, temporary \$2,000

1. Explanation of the Request and justification

Besides operating the Illinois State Planetarium, the department has been active in the last four years in improving other branches of our outreach program, namely the *Physics on the Road* (POR) program and the *ISU Solar Car*. This request is for POR support only. Initially funded by a grant from the APS/AAPT to Dr. Jay Ansher and the ISU Physics Club, the POR program has been highly successful in enhancing our presence in local and regional schools, and strengthening our partnerships with the Children's Discovery Museum, the Challenger Center, and WGLT. The POR program makes personal visits to schools, museums, *etc.* to spread the excitement of physics to children from elementary school through high school ages. In the calendar year starting January 2014, the program made more than 116 separate presentations to various groups reaching an audiences of 6819. Illinois State has gotten good publicity from the program as well, *e.g.* a front page *Pantagraph* article in January 2010. Each year, more students in the physics department choose to become active with the program. There are approximately 10 students at any given time who regularly participate, involved either helping give presentations, planning the presentations, designing equipment or demonstrations, or helping with publicity and web design for the program. POR is a wonderful service learning project for the participants.

Our POR request is modest: we request *travel support for the Physics on the Road Program*. It costs money to travel to schools carrying demonstration equipment. Expenses include rental van and lodging (for long distance trips) or personal car mileage (for nearby visits) and meals. Students are reimbursed from contractual funds so our request is mostly for that budget line.

2. Expected outcomes

The following outcomes are expected from the Physics on the Road project

- Continued visits to regional schools and other venues for outreach activities
- Improved visibility of Illinois State in the local and regional area
- Out-of-class service learning opportunities for physics and PTE majors
- Improved ties with partner institutions The Children's Discovery Museum and the Challenger Learning Center.

3. Budget and budget justification

- We request support for 15 POR trips during FY14. We request funds for van rental for 5 trips, lodging for 2 of these, and meals expenses for the volunteers who staff the program for all 15 trips. The total rounds to our \$2,000 request of contractual funds:
- Minivan rental: 5 trips @ \$65/day \$325
 Fuel for rental van: 5 trips @ \$60 per trip \$300
 Lodging Hotel Overnight: 2 trips (@ \$120/trip) \$240
 Personal car mileage: 10 trips (@ \$48.50/day) \$485
 Meals 15 trips, 4 people (@ \$10/trip per person) \$600
 Total \$1,950
- The department will purchase the commodities needed for these visits, estimated at approximately \$600.

Priority 11 Request: Department Office and second floor facilities update

Fit to Strategic Plans:

CAS: Goal 2.3; EI: G3S4, G4S4

Contractual, Equipment, and Commodities funds, *temporary* \$44,300

1. Explanation of the Request and justification

Physics has some "minor" needs that nonetheless would be useful to have met. By "minor" I mean that they are not directly related to either our teaching or research missions but are, to some extent, only practically useful or cosmetic needs. Here is a short list:

Five of the faculty offices and the hallway have carpeting that was installed in 1998 and is showing a good deal of wear, particularly in high traffic areas. It presents a poor first impression of the department to visiting scholars, to prospective students and families, and to interviewing faculty candidates. It is also buckled in places, which is a tripping hazard. We made a good deal of progress last fiscal year by painting and carpeting the main office, the conference room and 3 faculty offices. We also painted the student tutoring room.

Office furniture throughout the department dates to a time before any of the current faculty and staff were employed at ISU. We have had to replace chairs as old ones break, but a complete update is in order.

2. Expected Outcomes

The following outcomes are expected

- A more contemporary department office.
- Projection of a better institutional image to visiting scholars, prospective students/parents, and alumni.
- Better internal look for Moulton Hall, one of the architecturally interesting older buildings on the quad.

3. Budget and justification

Last fiscal year several faculty offices were painted and carpeted at a cost of approximately \$2,500 each. Assuming that the hallway will be a similar amount brings the estimate to \$15,000. The furniture is more speculative, and will depend strongly on whether we go with modular furniture or individual pieces. A quick estimate of 11 faculty offices with L-shaped desks (\$1000) and desk chairs (\$300) totals about \$14,300. New files and desk systems for the main office are approximately \$15,000 for a rough estimate of \$44,300. I would be happy to obtain a new firm quote from Facilities Planning if there is further interest in pursuing this project.

Priority 12 Request: Planetarium facilities upgrade FY15 Objective 7

Fit to Strategic Plans: PHY: Goals 9; CAS: Goals 1.2, 4.1, 4.2; EI: G3S2, G3S4

Equipment funds, temporary \$35,000 or \$1,500,000

1. Explanation of the Request and justification

This budget item is a perennial item in our request. It is listed as lowest priority, but only because of its magnitude, which we realize makes it unlikely to be funded. Nonetheless, we strongly support this upgrade as the only feasible way to assure the continuing operation of the ISU Planetarium into the foreseeable future. The department welcomes further discussion of this issue.

Planetarium Director Tom Willmitch has gone to great lengths to keep the current, obsolete projector operating. Despite his best efforts the planetarium's future rests on shaky ground. As parts fail it takes an increasing amount of Tom's time to repair the failed hardware, taking him away from his primary job of creating and delivering planetarium shows and educational events, not to mention his role in fundraising. This fact has been underscored by three major breakdowns of the star-projector over the past five years. Suffice it to say that all three failures involved outdated parts that proved difficult to find and replace. The ISU Planetarium's aging Spitz star-projector is now 50 years old and even simple electronic circuit parts that were common in 1965 are long-since obsolete. The problem of finding replacement parts has become so acute that the manufacturer now says they will terminate support for the instrument within the next four years. Clearly, it is a race against the clock to replace the Planetarium's star projector before a catastrophic failure occurs. Otherwise, this important component of the College's education and outreach programs, and a major component of the Bloomington-Normal community's growing public science activity destination, will be lost forever.

In addition to the star projector, the automation system is also 50 years old and, in fall 2011, the video projection system in the planetarium failed. Using department funds we were able to purchase a refurbished used system, allowing us to continue limping along at a moderate cost.

In the summer of 2014, we used departmental money to perform some badly need maintenance on the projector and it is anticipated that we can keep it limping along at least for the near future and this fall we secured \$30,000 to update the cove lighting for the planetarium.

Replacing the star projector and video projection with a new system will cost about \$1,000,000. This will purchase a reasonable optical star projector and a digital projection system. To do it right the cost will mount to around \$1,500,000, including some facilities enhancements (such as new seating). This is clearly not a sum that a single department or College can support. The former planetarium director Carl Wenning, current director Tom Willmitch, and the department Chair have all spent time looking for potential funding agencies to assist with the cost, without much to show. It is becoming clear that this upgrade is simply too big for a small department to deal with. Either state support or a major donor is needed.

A second option that was identified by Tom Willmitch is that we may have a mid 1970's

era star projector for the cost of installation, estimated to be \$35,000. Whereas this is still old technology, it is much newer and superior to our existing star projector. It has the additional benefit of a much lower cost on bulb replacements. (Bulbs for our Spitz projector are about \$1,300 each.)

2. *Expected Outcomes*

The following outcomes are expected

- Continued existence of the ISU Planetarium
- Much higher quality programs for students, school groups, partner institution groups, and the public
- The ISU Planetarium will play a more important leadership role in the development of a "science destination" status for the twin cities

3. *Budget and justification*

The department wants this item to be on the "radar screens" of the administration, so there will be no surprises when the current star projector shuts down for good. A rough estimate of the cost of the star projector and associated video projection system alone is \$1,000,000-\$1,500,000 including some facilities improvement. A full facilities upgrade including renovating the dome and new seating would be more. The department would be happy to discuss this issue at any time. The much more modest \$35,000 option would not solve the problem for the long term, but it would certainly be a big improvement and extend the life expectancy of the planetarium.

Other requests for temporary funds

1. Student Teacher Supervision Travel

Travel funds, temporary \$5,50000

a. Explanation of the Request and justification

Student teacher supervision is required of staff and faculty in teacher education programs and benefits the student teacher, the attending teacher in the high school, as well as the ISU teacher education program. It should be paid as a job related expense.

b. Expected Outcomes

The following outcomes are expected

Meet state requirements for student teacher supervision.

Continued excellence in department PTE program.

Match institutional expectations for TE faculty and staff with support level.

c. Budget and justification

The PTE program expects the FY16 need for student teacher supervision to be very similar to this year. In the fall 2014 semester, we expended \$2,500 and expect to use and additional \$3,000 in the spring. This brings the total request to \$5,500.

2. Instructional Travel

Travel funds, temporary \$4,150

a. Explanation of the Request and justification

Historically, the department has two kinds of instructional travel needs: (A) Travel to student conferences, and (B) travel associated with classes. This request mirrors (at a lower level) and supplements the department's FY16 Priority 8 operating budget request for undergraduate research travel support for three undergraduate research conferences: the Argonne Symposium for Undergraduate Research, the ISAAPT (Illinois Section of the American Association of Physics Teachers) fall and spring meetings, and the new PSAPS (Prairie Section of the American Physical Society) conference. Students presenting research talks at these conferences would be eligible for support. Communicating research results is an essential component of our undergraduate research program, representing a significant educational experience for the students. We also include instructional travel for PTE majors, as required in their coursework. The reason that this requests partially duplicates our Priority 11 request is that Instructional Travel has historically had an independent existence from enhancement fund requests. Of course, the department does not expect to receive funds from both programs.

b. Expected Outcomes

The following outcomes are expected

- Allow up to 12 students and their faculty mentors to attend the Argonne Symposium for Undergraduate Research in Science, Mathematics, and Engineering in fall of 2014
- Allow up to 10 students and their faculty mentors to attend the ISAAPT conference in spring semester, 2015.
- Allow a limited number of students to attend a national undergraduate research conference, the NCUR Conference, in June 2015, or the PSAPS meeting in fall of 2014.
- Provide PTE majors support for class associated travel.

c. Budget and justification

The following estimates of travel costs are based on our experience from previous years.

A. Student conferences

- Three conferences with undergraduate research sessions: \$3,500

B. Travel associated with classes

- Trip to Little Village for 16 PHY 209 (PTE) students \$ 150

- ISTA conference for 10 PHY 311 (PTE) students \$ 500Total \$4,150

3. Instructional Capacity and Gen Ed Request Personnel,

temporary \$43,048

a. Explanation of the Request and justification

Since we had three retirements last year, we are operating with deficit of instructional capacity. Even with the additional hire this year, we will still be short staffed. In addition, we will have one professor on a half year sabbatical.

Course	Function	Enrollment	# Sections	Semester-hours	Credit hours
PHY 102	Gen Ed	85	3	9	765
PHY 105	Gen Ed NSA/service	85	2	8	680
PHY 207	Gen Ed	40	1	3	120
Total			6	20	1,565

All of these are Gen Ed courses.

b. Expected Outcomes

The following outcomes are expected

- We will hire qualified NTT faculty or Faculty Emeriti to teach the Gen Ed and physics major courses listed above.
- Budget and justification: Gen Ed

This expected need will be for three 3 hour sections of PHY 102 (distributed across the fall 2013 and spring 2014 semesters), representing a 9 semester hour teaching assignment. In addition, PHY 105 is a 4 hour course and it is taught each semester for a total of a 8 semester hour teaching assignment. We estimate the need here based on particular instructors, but could change instructors based on availability. If an existing NTT teaches the PHY 102 sections and one section of PHY105 an Emeritus faculty teaches the other PHY 105 section and the PHY 207 section:

PHY 102, 3 sections of 1/4-time assignment: $3 * \$5881 = \$17,643$

PHY 105, 2 sections of 1/3-time assignment: $\$8775 + \$7885 = \$16660$

PHY 207, 1 section of 1/4-time assignment: $\$8775$

Total: \$43,048

The total is \$43,048. Please see the uploaded spreadsheet. Finally, staffing choices may not be as presented here, and some switching with TT faculty may be made. However, the total number semester-hours (20) will be covered with NTT and Emeriti faculty.

2.5.B. Descriptions of Permanent funds requests

Priority 2 Request: New ½ time staff position for lab/equipment support *FY15 Objective 2 Fit to Strategic Plans:*

PHY: Goals 1, 2, 4; CAS: Goals 1.1-1.4, 2.2; EI: G1S3, G2S1

**AP or CS position
permanent, new funds: \$4,500**

1. Explanation of the Request and justification

The department lost a critical support position to the FY04 permanent budget cut. The department has limped along with part-time variance support for the most critical duty of that former position: laboratory set-up and take-down for all PHY 105, 108, 109, 110-112 lab sections (with faculty and staff sharing other duties of that position). While this critical function is necessary, we envision a new lab support position at a more sophisticated level, being more closely tied to the future direction of the department and the institution. The position would include several more-or-less standard support duties, including

- (i) physics storeroom management
- (ii) physics laboratory set-up/take-down for all PHY 105, 108, 109, 110-112 lab sections
- (iii) physics demonstration equipment checkout to instructors
- (iv) departmental equipment inventory, basic equipment maintenance, and repair
- (v) introductory laboratory commodities purchasing; departmental shipping and receiving.

However, we propose to hire someone with at least a B.S. degree in physics with some experience in instrumentation, allowing higher-level functionality, such as

- (vi) support for all labs beyond the Gen Ed level, from introductory through research labs
- (vii) laboratory budgeting for all instructional labs, including the advanced lab
- (viii) design assistance with new apparatus for all labs, introductory through research
- (ix) assistance for faculty with the development of new laboratory exercises and demonstrations.
- (x) support for the department's extracurricular student projects, including the solar car team, the trebuchet team, and the Innovative Design Project.

A support staff person with the capability to work on the above tasks would work extremely well for our emerging applied physics curriculum and our experimental research program, and will therefore set the basis for the future growth of the applied physics program (the department's strategic goal #4)

2. Expected Outcomes

The following outcomes can be foreseen with a full-time permanent position

- Performance of basic lab support as delineated in tasks (i) through (v), plus the augmented support tasks (vi and vii), as described above
- Enhanced instructional laboratories at all levels
- Faculty and staff will be released from sharing duties (ii) through (v) above and be able to concentrate on their regular assignments, thus enhancing productivity.
- A thorough inventory and assessment of demonstration and experimental apparatus will be performed, eliminating unnecessary equipment and establishing order in the Physics

Storeroom

- The new position will work with faculty to develop a strategic plan for all lab classes.

3. *Budget and explanation*

According to the American Institute of Physics, typical full time starting salaries for physics B.S. graduates ranged from about \$25,000 - \$60,000 in 2009-2010 (depending on employment sector; <http://www.aip.org/statistics/trends/highlite/emp3/figure2b.htm>). Adjusting to 2014 using a 2% per year increase yields a range of about \$27,060 - \$64,900. Setting the ½ time salary near the middle of this range (at the low end of the private sector range) at \$22,000 should allow us to be at least minimally competitive. The department will use about \$17,500 in permanent NTT base funds to help support this request, leaving a proposed need of only \$4,500.

Priority 5 Request: Fully fund the Planetarium Director**FY15 Objective 7****Fit to Strategic Plans:**

PHY: Goals 9; CAS: Goals 1.2, 4.1, 4.2; EI: G3S2, G3S4

Personnel funds, permanent \$4,588**1. Explanation of the Request and justification**

Historically, the Planetarium Director position at Illinois State was a 12 month appointment. When the previous Director transitioned into the PTE Program Director position, the department was only able to obtain new funds for a 9 month Planetarium Director position. With the agreement of all concerned at the time, the position was advertised as a 10 month position, with the tenth month to be paid from planetarium income.

The current Planetarium Director, Thomas Willmitch, was hired into that position and has performed well since he began in Fall 2000. However two points regarding the position rapidly became clear: (1) Using income funds to partially cover salary has several significant disadvantages, and (2) 10 months is still not sufficient to handle the full load of developing and producing shows, managing the presentations and gift shop, supervising student assistants, maintaining the equipment, and raising funds for the planetarium.

The most obvious disadvantage is that annual raises require an increasing amount of planetarium income to pay for that tenth month. Another drawback to the income-funded salary model is the fact that the planetarium income could be used for other important needs if it were not required to pay the Director's salary. Recently an administrative issue has surfaced, which also makes the 10 month appointment with only 9 months of GR funding a problem. The new budget system (iPeople and Budget Wizard) has no way to handle this kind of appointment internally, with 9/10 funding from GR and 1/10 from an Agency account, requiring human intervention in order to get the Director paid. So, while we have limped along with the current funding model for several years, it is not a permanent solution. We were able to permanently move limited variance funds to this position in FY06 when another AP position changed incumbents, but this supplement was able to cover little more than the excess raise amounts that had accumulated.

Mr. Willmitch is truly dedicated to the ISU Planetarium and to its audience of school children, ISU courses, and the public. Funding this 10 month position from GR will solve the basic problem. (we leave restoring this position to its historic 12 month appointment to a future year.) The planetarium income funds not spent on his salary will benefit the planetarium by allowing better maintenance and repairs, which are regularly needed. Our request is for permanent GR funds to bring the position up to its 10 month level.

2. Expected Outcomes

The following outcomes are proposed

- Mr. Willmitch will spend less time on accounting and fretting over his salary and more time creating and delivering planetarium shows, partnering with the community, and

cultivating donors.

- With the financial stress of his salary off the planetarium income account, Mr. Willmitch will be able to use this income for regular maintenance and upgrades.
- The ISU budget system will be able to handle the appointment correctly.

3. Budget and justification

Mr. Willmitch's FY15 base monthly salary is \$4,498, so the following options are offered: Request: 1 extra month (for 10 month GR funding assuming 2% raise): \$4,505

Priority 6 Request: Student support: UTAs*FY15 Objective 3****Fit to Strategic Plans:***

PHY: Goals 1, 6, 7; CAS: Goals 1.1-1.3, 4.2; EI: G1S1, G1S3

Student help, permanent \$9,000***1. Explanation of the Request and justification***

Since *the physics department has no graduate students*, and therefore no graduate assistantships, the department's Undergraduate Teaching Assistant (UTA) program was established to recruit students with sufficiently good academic records to assist in grading, and, for those with the experience and desire, teaching Gen Ed and introductory physics labs. The program offers valuable experience to students, particularly PTE majors and those going on to graduate school, assists our students with financial need, and allows the department to more efficiently focus faculty expertise on offering more sections of these courses and on their scholarship.

Due to increases in student wages, largely driven by minimum wage increases, and an expansion of the number of lab sections, the department finds itself in the position of not being able to afford the UTAs necessary to cover the labs we offer. In response, we have either used sporadically available variance funds to cover these expenses, or had to trim back our student office assistance budget and to assign faculty and AP staff to grade and teach labs. The request is to cover the shortfall between our permanent base student regular budget and the need, which is estimated in part 3 below.

2. Expected outcomes

The following outcomes are proposed

- Fully staff the 100-level labs with graders and as many qualified UTA teachers as are available
- Add a limited number of office assistant hours to ensure coverage every day over lunch hour and for events like the colloquium, award ceremony, *etc.*
- Allow more flexible staffing of faculty to teach lectures and do research, thus allowing them to maintain high department productivity levels
- Allow permanent office staff to work on more important projects, such as maintaining and improving the departmental databases, better faculty support, and assistance with alumni relations.

3. Budget and budget justification

Our FY15 base budget includes about \$24,000 in student regular funds to support both UTAs and office assistants. Our records over the past years when variance was available indicate typical student employee costs of about \$44,000, leaving a shortfall of about \$20,000. Our need for UTA's has also grown over the past ten years. For example, PHY105 used to have 1 section with about 6 lab times. It now has 2 sections with 13 lab times. Our student help budget has not kept up with this increased demand.

Our priority 3 budget (temporary) request this year is \$11,000 in tech-tuition lab monitor support. If this is funded, we request a permanent increase of \$9,000. If that request is *not* funded, our net need would be increased to about \$20,000. Note that this figure is simply to stay on par with this year's number of student work hours.

APPENDIX 1: Physics FY14 variance plan

To date, Physics has not filed a variance plan (this should be rectified ASAP). Attached is a list of the funding source together with the amount spent on various NTTs. Note that even with the extensive use of NTTs this year, we still had to cancel some courses.

Faculty	Course	Cost/sem	Income source	Amount
Clark	207 F	\$8,775	Prem. Variance	\$35,803.00
Holbrook	2 STS	\$2,340	Inst. Cap.	\$52,890.80
Karim	240 F	\$8,775	Rutherford CeMaST	\$8,000.00
Wenning	102A F	\$8,775	Martin Variance	\$51,160.50
Zich	102A F	\$7,855		
Zich	102B F	\$5,881		
Zich	lab support	\$7,885		
Clark	102 A S	\$8,775		
Holbrook	105 S	\$6,000		
Tripathi	355 S	\$4,500		
Zich	102 B S	\$5,881		
Zich	102B S	\$5,881		
Zich	lab support	\$7,855		
Wilmitch	summer			
Zich	summer			
		\$89,178		\$147,854.30