Proposal for the Use of the FY2001 Technology Fee
Submitting Organization(s): Department of Physics and Astronomy
Contact Person (Name, email, phone): William H. Nelson, wnelson@gsu.edu, x3221

1. Executive Summary

**25 Word Project Description:** Technology Fee funds will be used to expand the number and maintain the viability of computers, specialized software, and instructional technology equipment in Physics and Astronomy instructional laboratories.

<table>
<thead>
<tr>
<th>One-time Costs</th>
<th>Ongoing Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>$23,727</td>
<td>$37,293</td>
</tr>
</tbody>
</table>

2. Project Description

The Department of Physics and Astronomy currently provides and maintains a total of 34 workstations (22 Windows-based and 12 Macs) in four instructional laboratories (NSC 210, NSC 222, Kell 516, and Kell 528) for various instruction-technology and general-purpose uses by students. These workstations are primarily used by students in the introductory courses whose laboratories are taught in these rooms (Astr 1010, Astr 1020, Phys 1111K, Phys 1112K, Phys 2010/3010, Phys 2211K, and Phys 2212K). In addition, the Department holds single-user licenses for Mathematica on three different platforms: Windows, SGI-Irix, and Linux. Although the Mathematica installations are available for use by students at all levels, practicalities forced by the single-user licenses mean that its use is primarily by upper level physics majors and students in the graduate programs (PhD. Program in Astronomy; M.S. and Ph.D. Programs in Physics).

The objectives of this project are:

1. To expand the number of computers available in the NSC laboratories by increasing the number in NSC 210 from six to eight, and by installing eight in laboratory room NSC 226 where none are now installed;

2. To maintain viability of the facilities by establishing a fund for replacement of the computers on a three-year cycle;

3. To increase and enhance utilization of the facilities by staffing the labs at non-instructional times with an appropriately trained Graduate Laboratory Assistant (GLA) or Student Assistant (SA);

4. To increase the instructional value of existing Mathematica licenses by making the package more widely available with additional user licenses;

5. To enhance the delivery of instruction in the introductory astronomy laboratories by providing a suitable digital projector for use while the laboratories are in progress.

3. Relevance to Regents Guidelines

The objectives listed above all fall under Regents **Guidelines 1 - 3**, and somewhat under **Guideline 6**. Specifically, the objectives are to provide increased access to IT facilities within laboratories associated with
courses either required by their specific programs or required to meet general education requirements. It is important to note that the courses listed above have integrated laboratories and all can be used by students to satisfy the core laboratory science requirement. Thus the laboratory is a requirement of the course and not an option. Moreover, because of their computation-based character and data presentation requirements, science course laboratories provide an ideal setting for introducing students to computer use, and for further developing skills they may already possess.

Objective 3, support for a GLA or SA, generally falls under **Guidelines 1-3** also since the benefits of computer availability are enhanced by the availability of appropriately trained assistance. However, this objective also falls under **Guideline 6** since current GLA and SA support is insufficient to provide this assistance.

**4. Justification of One-time Funding Requirements**

The specific one-time funding requirements are as follows:

1. New computers for NSC 210 (2) and NSC 226 (8) 10 @ $1382 $13,820
   (Price for Dell Optiplex GX110 from Dell website, 6/7/00)

2. Printer for NSC 226: HP4050 $1,365
   (Price from DOAS website 5/31/00)

3. Relocation of existing network connections, NSC 226 2 @ $250 $500

4. Mathematica upgrades and additional user licenses
   (Windows, SGI-IRIX, and Linux; Prices estimated from Wolfram website, 6/8/00)
   3 @ $1800 $5,400

5. Digital projector: InFocus LP-0425-ZV-B $2,642
   (Price from DOAS website, 5/31/00)

**TOTAL** $23,727

Justification of these is as follows:

X *Items 1, 2, and 3* will be used primarily in connection with the laboratory component of courses Phys 1111K, 1112K, 2211K, and 2212K. As mentioned above, these are basic laboratory science courses and, as such, the laboratory is required. Overall enrollment in these courses is high; for example during the 1999-2000 academic year (Su99 - Sp00), a collective total of 1248 students enrolled in these courses. Since a natural feature of physics is its quantitative character, making computers available directly within the laboratories is an important element for laboratory effectiveness.

In addition, the increase in facilities requested for NSC 210 and NSC 226 is driven by the rapid growth in the Computer Science undergraduate program. Specifically, CSC students take courses Phys 2211K and 2212K both for core and programmatic requirements. The CSC program has grown rapidly, from 385 majors in fall 1996 to 716 in fall of 1999. In parallel, the demand for Phys 2211K and 2212K has grown (from 201 in 1997-98 to 343 in 1999-00) forcing an increase in the number of laboratory seats and expansion of the laboratory for those courses into NSC 226. Since NSC 226 has no computers currently installed, eight and a networkable printer are required for meeting the responsibilities of the increased demand.

X *Item 4*, an increase in Mathematica licensing, will permit wider use of this very useful tool by students in all our courses, ranging from freshman to graduate.
Item 5, a digital projector, will be used within the laboratories for introductory astronomy courses Astr 1010 and 1020. In addition to being a quantitative science, astronomy is a highly visual field, and therefore the facilities for projecting images onto a screen for all students to see is important for fully effective delivery of instruction. As for the introductory physics courses, these serve a large number of students; for example, the total enrollment was 1450 for the period Su 1999 - Sp 2000. It is important to note that the laboratory rooms, 516 and 528 Kell have permanently installed screens but have no video / digital projection equipment. The projector listed is portable and will be stored in the equipment room associated with the laboratories. Thus it will be available for use in either laboratory room as needed.

5. Continuing Funding Requirements

Continuing funding requirements are as follows:

6. Replacement of 32 Windows computers on a 3-year cycle $14,741
   (For rooms NSC 210, NSC 226, Kell 516, and Kell 528; calculated for Replacement by Dell Optiplex GX110 at 32 x $1382 / 3)

7. Replacement of 12 Mac computers on a 3-year cycle $7,552
   (For room NSC 222; calculated for replacement by Power Mac G4 with monitor at 12 x $1888 / 3; price from Apple website, 6/7/00)

8. GLA position for support of student use of the facilities during non-lab times $15,000
   (This is for one equivalent position; however, we envision several students sharing this activity and thus that the funds will be divided accordingly.)

   TOTAL $37,293

6. Accountability of Funds

Since the funds are primarily for equipment, accountability of these items will be maintained via normal purchasing and inventory control procedures. Use of GLA funds will be accounted for by tracking specific student assignments.

7. Additional Funding Required, Non-Technology Fee

   None

8. Impact on Computing/Network Infrastructure

All required network connections already exist as do most of the computers. Thus, the impact on network traffic should be virtually nil. The only network-related work is the relocation of two jacks as listed above.