2007.0055

# Student Technology Fee
# Funding Request Form
# Surplus Funds for Fiscal Year 2006-07
# Northwestern State University of Louisiana

**This document will not be accepted without complete information, detailed budget, specifications of each piece of equipment requested and pricing.**

Prepared by: Greg Giering For: Dept. of Chemistry & Physics

College: Science & Technology Campus: Natchitoches Department: Chemistry & Physics

Where will requested equipment be located/installed/housed: Bldg. 086 Fournet Hall Room 126A

Are property policies and procedures in place by the department for equipment requested. Yes

Delivery to the Student Technology office located in Watson Library, Room 113. Date 4/17/07

1. Describe target audience.
Entry to advanced level students enrolled in Physics Lab. This includes: Physics, Chemistry, Biology, Mathematics, Pre-Med, and Nursing majors.

2. Describe project/initiative for which you are requesting funds.
Development of a new lab to train students in the application of Newton Laws including: force, projectile motion, and conservation of energy.

3. State measurable objectives that will be used to determine the impact/effectiveness of the project.
To give students a tangible example of Newton's Laws in application.

4. Indicate how each project objective will be evaluated.
Students will prepare lab reports which will be evaluated by the instructor on a 100 point scale to determine the student's comprehension of Newton's Laws.
The course syllabus will be inspected and compared to previous syllabi to insure that the experiments are not too simplistic but also not too complex for undergraduate students.

5. Provide a justification for funding of the project. Estimate the number of students that will be served per academic year and in what ways. Please indicate also any unique needs of the target group.
Approximately 200 students per year will use the purchased equipment. It is a staple of physics labs including Phys 2041, 2521, 3291, and 3301 and demonstrates basic physical principles covered in the corresponding Phys 2040 and Phys 2520 lectures. The incorporation of the listed equipment into a laboratory setting is essential to experimentally clarifying the principles that are covered in both general and upper level physics classes including Hooke's Law, Spectrophotometry, electron charge-

to-mass ratio, and Millikan's discovery of the fundamental charge unit, $e^-$. Furthermore, the equipment listed provides demonstrations of applications and technology that have arisen from concepts developed ranging from the inception of physics to the early twentieth century. Finally the quantity of equipment in the request will allow students to participate in a cooperative laboratory environment suited to small groups.

6. If funded, which NSTEP (http://www.nsula.edu/nstep/NSTEP.pdf) objective will this funding of this project advance. How will funding of the project advance the University and College / unit technology plan?

   Purchasing this equipment will reflect objective 2 of NSTEP by facilitating an environment in which the individual students will have the opportunity to construct his/her knowledge of Newton's Laws.

7. List those individuals who will be responsible for the implementation of the project/initiative and indicate their demonstrated abilities to accomplish the objectives of the project.
   Greg Gieing—extensive teaching experiences
   Weijia Zhu—PhD in Physics

8. Describe any personnel (technical or otherwise) required to support the project/initiative.
   None

9. Provide a schedule for implementation and evaluation.

   The requested instrument can quickly be purchased through PASCO. Therefore, implementation should begin in the Fall 2007 semester. Evaluation will commence at the end of the semester and based upon: 1) student's understanding of Newton's Laws and 2) accuracy of data

10. Estimate the expected life of hardware and software. Explain any anticipated equipment/software upgrades during the next five years.
The equipment should be durable and serviceable for more than 10 years. Upgrades should not be necessary.

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11. Explain in detail a plan and policy that will be in place to ensure property security/controls for any equipment received through Student Tech Fee.
The equipment is locked in the physics lab to which it is assigned. A sign-out sheet in the lab is posted on the wall, which allows professors to administer proper control and security.

| | |
|---|---|
| **12.** | Attach a detailed budget, including: specs., description, cost, state contract number, and vendor for each item; cost of outside support personnel; and a description of how the proposal will support University/College/unit resources (i.e., cash match, funds from other sources, or reallocation of existing hardware/software or other equipment. **All of the information requested must be attached or the request will not be accepted.** |
| 13. | Attach a letter of support for the project signed by the requesting unit's Dean, the appropriate Vice President (for non-academic units), or the SGA President from the requesting campus (for student requests). |

**Detailed Budget:**

| Item | Vendor | Catalog # | Units | Price Each | Total Price |
|---|---|---|---|---|---|
| Ballistic Pendulum | Pasco | ME-6830 | 10 | $659.00 | $6590.00 |
| e/m | Pasco | SE-9625 | 1 | $3539.00 | $3539.00 |
| Milikan Oil Drop Apparatus | Pasco | AP-8210 | 1 | $1659.00 | $1659.00 |
| Spectrometers | Pasco | SP-9268 | 10 | $1159 | $11590 |
| Grand Total | | | | | $23,378.00 |

# Ballistic Pendulum Accessories

## Ballistic Pendulum Accessory ME-9892

## Mini Launcher Ballistic Pendulum Accessory ME-6829

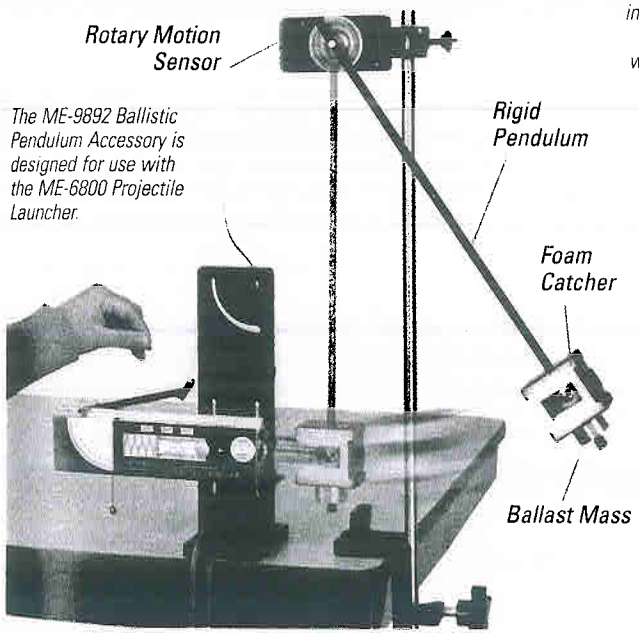
- Computer-Based Measurements
- Both Elastic and Inelastic Experiments
- Low Cost

*The ME-6829 Mini Launcher Ballistic Pendulum is designed for use with the ME-6825A Mini Launcher.*

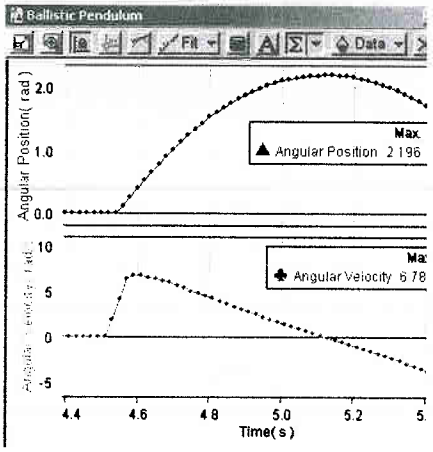
The Ballistic Pendulum Accessories use a Rotary Motion Sensor to measure the speed of the catcher assembly immediately after the collision, as well as the maximum height to which the pendulum swings. The Rotary Motion Sensor can also be used to measure the rotational inertia of the pendulum, for detailed study of the collision using conservation of angular momentum.

The rigid pendulum can be attached to the Rotary Motion Sensor at two locations (at the end of the rod and at its center) to vary the Rotational Inertia. In addition, the included Ballast Mass can be added to the end of the pendulum to increase the inertia. The Rotary Motion Sensor can also be mounted with its rotation axis vertical, allowing the pendulum to swing around in a horizontal circle, to study collisions without involving gravity and changes in potential energy.

The initial launch velocity of the ball can be calculated using projectile motion, or measured directly using photogates (not included).




*The ME-9892 Ballistic Pendulum Accessory is designed for use with the ME-6800 Projectile Launcher.*




*Rotary Motion Sensor (required for use) allows measurement of instantaneous velocity of catcher immediately after collision, as well as total angle of rotation of the pendulum arm.*

| ***Additional Equipment Required for both ME-9892 and ME-6829*** | | |
|---|---|---|
| Table Clamp | ME-9472 | p. 178 |
| Steel Rod (90 cm) | ME-8738 | p. 176 |
| Rotary Motion Sensors | CI-6538 or PS-2120 | p. 24,50 |
| ***Recommended:*** | | |
| Photogate Head | ME-9498A | p. 51 |
| Photogate Mounting Bracket | ME-6821A | p. 133 |

### Includes:

Pendulum Arm with Catcher
Ballast Mass
Steel Ball

| **Ballistic Pendulum Accessory** | **ME-9892** | | **$89** |
|---|---|---|---|
| ***Required:*** | | | |
| Projectile Launcher | ME-6800 | p. 128 | $320 |

### Includes:

Pendulum Arm with Catcher
Counter Weight
Ballast Mass

| **Mini Launcher Ballistic Pendulum Accessory** | **ME-6829** | |
|---|---|---|
| ***Required:*** | | |
| Mini Launcher | ME-6825A | p. 129 |

# istic Pendulum

:30

## xtremely Accurate—
## 2.5% of Predicted Values

## oth Elastic and Inelastic
## xperiments

## ojectile Launcher
## xperiments

ying the laws of Conservation of and Conservation of Momentum to e the velocity of a projectile with no an simple mass and distance mea- nts has made this a classic physics stration.

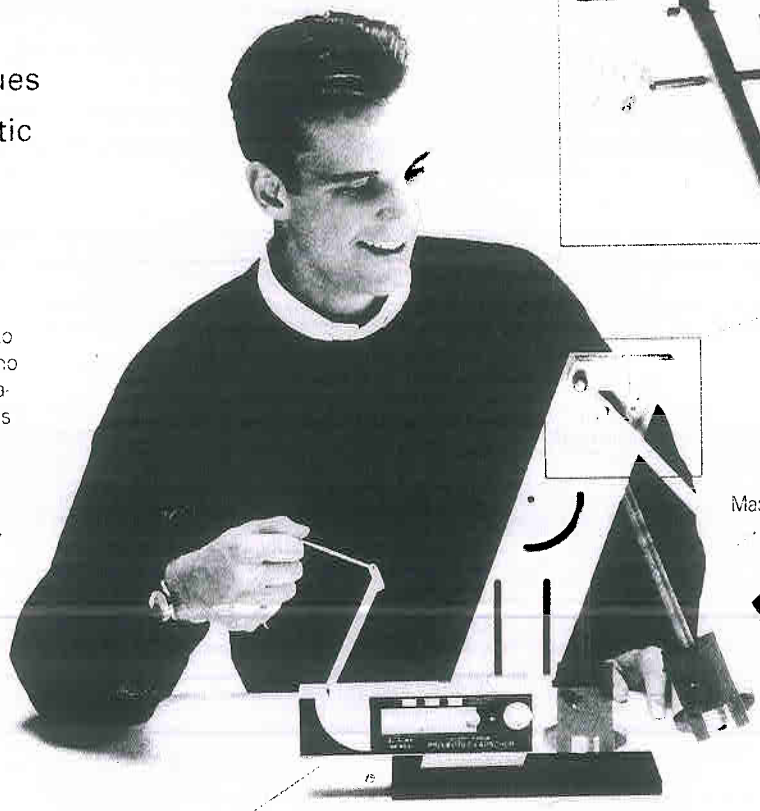
### It Works

ctile is fired into a pendulum, it to rise.

ne projectile mass, the pendulum nd the rise in pendulum height, s can calculate the gravitational al energy of the system.

ne potential energy is equal to ndulum's kinetic energy at the point. students can calculate eed of the pendulum at impact.

ng the Law of Conservation of ntum, the projectile's speed is calculated.



*Unique Angle Measurement Design*
Easily measures pendulum angle to 0.5 degree. Low friction gives repeatable results.

*Removable Pendulum*
Mass can be easily determined. Reverse the pendulum for elastic collisions.

*Projectile Catcher*
Securely captures ball.

*Projectile Launcher*
Durable with 3 repeatable launch settings.

*Add Masses*
Two 50 g masses (included) may be added to change the pendulum mass and rotational inertia.

*Mount the launcher on the other side of the base and perform the full range of projectile launcher experiments.*

## Already Own a PASCO Projectile Launcher?

e base and pendulum assembly can rchased separately. See the order for more information.

## PASCO's Ballistic Pendulum—A New Approach

The PASCO Ballistic Pendulum has the following unique features:

**Repeatable:** The 3 velocity settings on the Projectile Launcher produce consistent velocities.

**Accuracy:** The 0-80° angle measurement scale resolves to 1/2°, leading to experimental results within 2.5% of predicted values

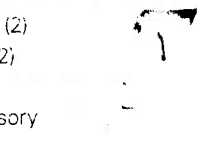
**Removable Pendulum:** Remove the pendulum to determine its mass and center of mass. It can swing freely so students can determine its rotational inertia. Mount the pendulum back-wards so the ball bounces away for elastic collision experiments.

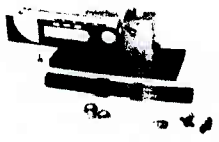
**Vary Ball and Pendulum Mass:** Two 50 g masses can be added to the pendulum, and 2 steel and 2 plastic balls are included.

**Projectile Launcher:** Mount the Projectile Launcher on the other side of the base, and students have access to all the accessories that come with the ME-6800 Projectile Launcher (see previous pages).

## Includes:

Ballistic Pendulum and Base
Projectile Launcher
2.5 cm Plastic Balls (2)
2.5 cm Steel Balls (2)
Masses (2)
2-D Collision Accessory
Safety Glasses (2 pairs)
Operations and Experiment Manual





| | | | |
|---|---|---|---|
| **Ballistic Pendulum** | **ME-6830** | | **$659** |
| **Ballistic Pendulum (No Launcher)** | **ME-6831** | | **$399** |
| ***Recommended:*** | | | |
| Spherical Mass Set | ME-8968 | p. 198 | $55 |
| Shoot-the-Target | ME-6853 | p. 131 | $289 |
| Time-of-Flight | ME-6810 | p. 133 | $79 |
| Large C clamp (6 pack) | SE-7283 | p. 178 | $64 |

**SHANTEL WEMPREN**
PRESIDENT
**STUDENT GOVERNMENT ASSOCIATION**
NORTHWESTERN STATE UNIVERSITY
*A Member of the University of Louisiana System*
*318.357.4335*

April 16, 2007

To Whom It May Concern:

I fully support the grant to purchase new ballistic pendulum and necessary accessories. Students at Northwestern should have the very best of equipment to work with and learn from. I strongly believe in lab development and enhancement.

I encourage the committee to accept this grant and to further positive lab and classroom development.

Yours in Leadership,

Shantel Wempren
President
Student Government Association