Marsh White Final Report
University of Louisville
Society of Physics Students

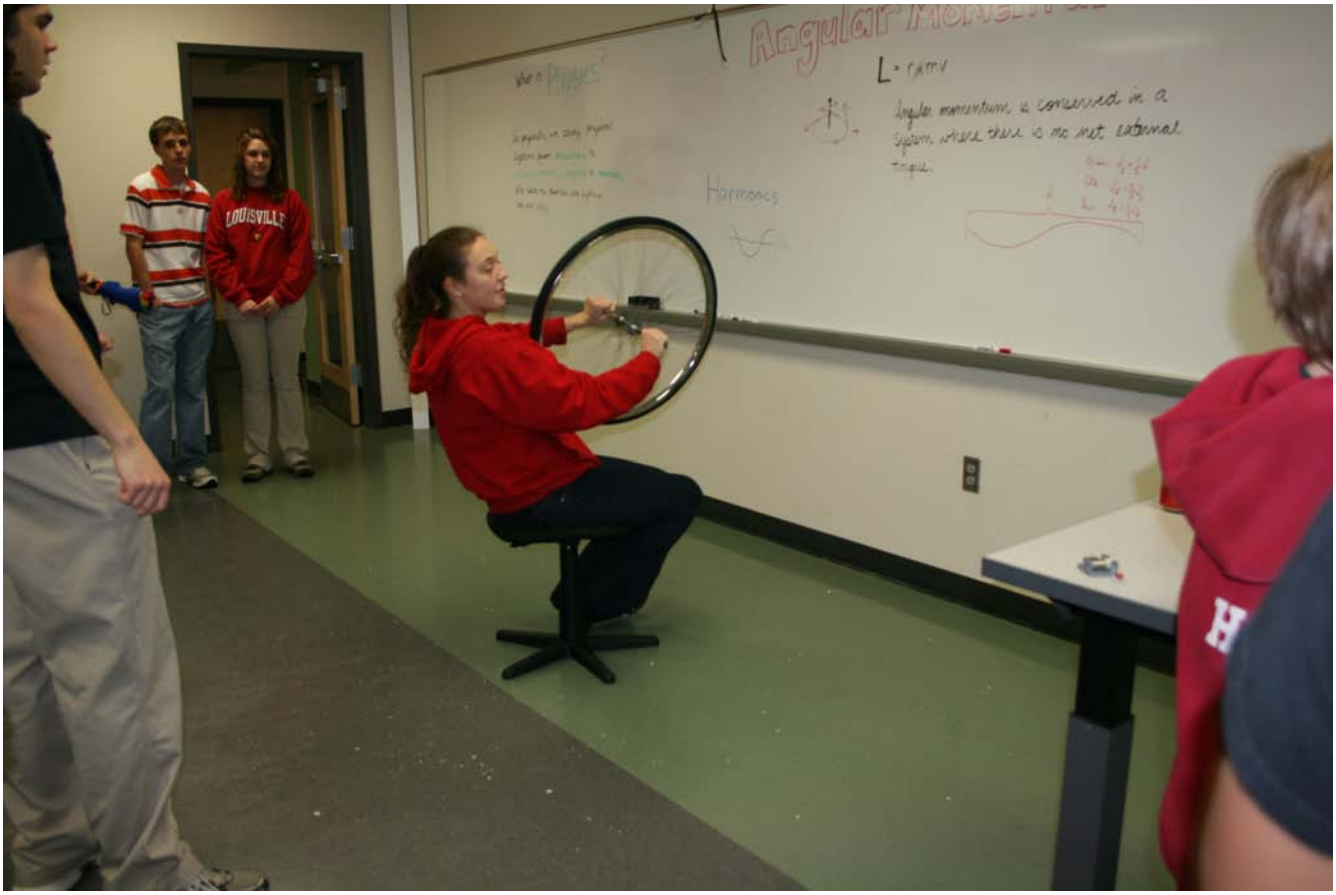
The University of Louisville Society of Physics Students (SPS) submitted a proposal to the SPS National Office for a Marsh White Award to further its outreach efforts - the members were interested in preparing a new and safe Rubens Tube experiment, a chair and bicycle wheel for demonstrating angular momentum, as well as purchasing a number of additional demonstrations. The University of Louisville Chapter of the SPS has long been active in outreach to local schools. As the state of Kentucky is severely lacking in its general scientific focus for young people (especially in physics), it is especially important that the students share their excitement about physics with their fellow Kentuckians. Multiple times a year students go to local middle and high schools to talk to their physics classes about why they should consider a physics or other STEM (Science, Technology, Engineering and Math) degree in college, and informing them of the opportunities that await them. As part of their presentation, the SPS students employ simple demonstrations to teach the students basic scientific principles, such as conservation of momentum, sound waves, inertia, and friction.

In particular, chapter vice-president Mathew Nichols was interested in constructing a safe Rubens tube demonstration for use in schools. A Rubens tube is also known as a standing wave flame tube, and is a perforated sealed metal tube filled with propane which is lit as it leaves the holes in the tube. One end of the tube has a membrane which is driven by sounds from a speaker - the resulting changes in pressure within the tube are reflected in the heights of the flames from the holes along its length - and thus it demonstrates the relationship between sound waves and pressure. With the help of the Marsh White award and the (unexpected) free acquisition of a refillable propane tank, regulator and hose a new Rubens tube was

Caption: University of Louisville SPS members with the new Rubens Tube demonstration. From left to right back row: Tim Thorson, Adam Braun, Austin Carver (2010-2001 chapter president), Neil Torrez, Brian J Baker, Rob Domek, Patrick Mullaney, Matthew Forsthoefel, Michael Snyder. From left to right middle row: Joey Lynch, Richard Bagby, Jason Effinger, Shannon MacKenzie, Jamie Bougher, Jennifer Wojno, Jenna Lichtenberger, Daniel Showalter, in the front (sitting by table): Dr. Lauroesch (SPS advisor), Matthew Nichols 92010-2011 vice president).

constructed in the student shop by SPS members. This new tube has been tested twice and, after a few modifications (to be completed this summer and fall) to precisely limit the propane flow, is expected to become part of the regular SPS demonstration materials.

Experience with school groups has shown that one of the favorite demonstrations is the use of a bicycle wheel to demonstrate angular momentum. To further the use of this experiment, a low friction spinning seat was purchased. This was used at the University of Louisville Engineering Exposition (EE2011) with prospective students.



Caption: Demonstration of angular momentum at EE2011 Photo by Jared Hatfield (Speed School of Engineering student).

Prompted by a need to reorganize the SPS office in preparation for moving to a new space, chapter members combed through the current supply of demonstration materials at the beginning of the spring semester. After the Marsh White award was announced it was decided by the SPS officers to use some of the savings from the Rubens tube construction to purchase additional demonstrations. Commercially available demonstrations of Lenz's Law, kinetic to heat energy (via colliding balls) and a Magnetic Field Observation Box were purchased.

Table 1: Marsh White Award Expenses

Equipment for Ruben's Tube	$101.67
Rotating stool for Momentum Wheel demo	$ 26.62
Colliding Steel Sphere - Kinetic energy to heat demo	$ 29.95
Lenz's Law Apparatus	$ 18.00
Magnetic Field Observation Box	$115.00
Shipping	$ 12.00
Total	$303.24