Demonstrating Physics with Fire and Sound

Marsh W. White Final Report

Missouri State University

Society of Physics Students

Springfield, Missouri

Proposer: Jacob Swett, President of MSU SPS Chapter

Faculty Advisor: Dr. Lifeng Dong

Project Cost: $175.00

31 May 2009

Receiving the Marsh W. White Award has been a great honor to the Missouri State University's Society of Physics Students. With the award we have successfully purchased all the parts for and constructed a superb Rubens' Tube. Although we ran into many difficulties trying to find all the necessary components and the construction of the tube was certainly a learning process for all involved, nevertheless the final outcome made all of the effort worthwhile.

For quite awhile our chapter of the Society of Physics Students at Missouri State University had been brainstorming to try and find different ways to engage students and the general public in physics in ways that they would find interesting. After much thought the chapter decided that a Rubens' Tube would be a perfect demonstration to fit our needs, however, the cost of implementing such a demonstration had prohibited us. The Rubens' Tube combines fire and music, both of which interest the typical student of all ages and the public.

A Rubens' Tube also known as the Standing wave flame tube, or simply flame tube, is a physics experiment demonstrating a standing wave or other waves such as those generated by music. It shows the relationship between sound waves and air pressure visually by the different heights of the flames.

We have already successfully demonstrated the Rubens' Tube at a local elementary school where it was received very well and we have also given demonstrations to many other individuals. We plan to demonstrate the Rubens' Tube much more in the coming years. Next fall we plan to demonstrate the tube on Missouri State's campus several times throughout the year and to continue visiting local schools to spread the joy of physics.

We would have liked to have demonstrated the Rubens' Tube at more schools last semester, however, we ran into many difficulties acquiring the necessary materials and were only able to demonstrate it once. Be assured though that we intend to hold many demonstrations of the tube for many years to come.

Final costs were as follows:

$60.64	4 ft. long 3 in. diameter Steel Tubing
$21.99	Metal Stand for Rubens' Tube
$19.97	Brass Fittings and Valve for Propane
$34.23	Propane Regulator and Tubing
$49.99	Propane Tank
$186.82	**Total**
$175.00	**Total Amount of Grant**
$11.82	**Amount Paid by MSU SPS Chapter**

Note: To reduce our costs we were able to procure a speaker from the technology department at the university and were borrowed all the necessary tools to create the Ruben's Tube.

The Rubens' Tube was constructed by members of Missouri State University's Society of Physics Students. Participating members were: Jacob Swett, Matt Thompson, Jeffery Doak, Steven Armour, and Justin Graber. We were also assisted by the Department of Physics, Astronomy, and Material Science and the Department of Industrial Management.

On behalf of Missouri State University's Chapter of the Society of Physics Students we would like to once again thank the Marsh W. White selection committee for funding this wonderful project. This project was already brought the wonder of physics to many students and will continue to do so for many years to come.

Thank you,

Jacob Swett, SPS President, Missouri State University

Dr. Lifeng Dong, SPS Advisor, Missouri State University