

# Marsh White Award Final Report

## University of Louisville – June 2008

The UofL SPS chapter applied for the Marsh White Award with the express intent building a Rubin's Tube for use in outreach at the University of Louisville and in the city of Louisville as a whole. Our Ruben's tube was successfully constructed and consists of a five foot length of Iron Pipe with eighth of an inch diameter holes drilled into it every ince. Propane is supplied from a tank for a propane grill, and a latex mebrane is vibrated using a Karaoke speaker such that standing waves in the tube are visualized in varying height of the flames along the tube. Our versatile construction allows the Ruben's tube to be used with music from a keyboard, computer, or ipod.

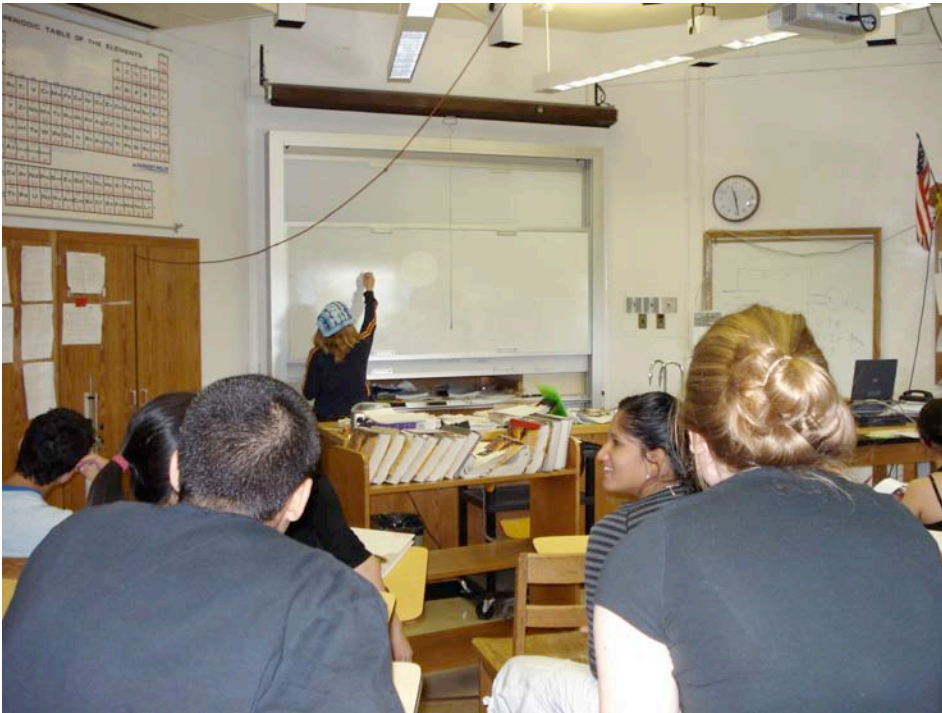
The funding was used as follows in the construction of the Ruben's Tube:

### Budget Expenses for Amrsh White Outreach:

1. Ballcock Service Pack	\$3.29
2. 1/8 inch Cobalt Drill Bit (2)	\$5.98
3. Thread Seal Tape	\$1.49
4. 1/2 inch Drill Bit	\$19.99
5. Silicon Caulk	\$4.79
6. Tap1/4x18 NPT	\$6.49
7. Flange Floor 1.5"	\$8.49
8. Male Connector 3/8x1	\$1.99
9. Caps 1.5" (2)	\$2.99
10. Fasteners	\$0.46
11. Funnel 6"x18"	\$1.99
12. Regulator with Hose	\$21.99
13. Black Pipe 1.5"x5'	\$17.45
14. Plumbing Service	\$4.00
15. Full Propane Tank	\$45.99
16. Used Karaoke Machine	\$40.00
17. 1/4" Stereo to RCA Adapter	\$5.29
Subtotal:	\$192.67
6% sales tax:	\$11.56
Total:	\$204.23

The Ruben's tube has been demonstrated several times since it's completion. At Louisville's Dupont Manual Magnet High School it was demonstrated over two days to three different classes with over 80 students total. After a lecture on the physics of standing waves and interference we lit up the Rubin's tube. Students were shown the result of pure tones of varying frequencies using the keyboard and then those with musical training were invited to come and play a song for their peers. Following this a selection of songs with varying instrumentation were demonstrated and the relationship

between wave forms and the tone of an instrument were discussed. The students were then invited to try out songs of their own if they had an ipod or other personal music device with them. Pictures of this event are shown below:



Other Demonstrations to date have taken place in the less formal venue of my apartment for sometimes as many as 30 UofL students, or as few as one when I was teaching myself to optimize its use.



This is only the beginning of this demonstrations life. The physics teacher's for whom we did the demonstration at manual have already asked that we demonstrate the Ruben's tube every year when they cover standing waves. We may expect similar use for lectures at UofL and other High Schools. Another idea that occurs to me is to use the tube as a fundraiser at UofL. If a suitable location for outdoor demonstration can be found then the tube we could ask passerby's for donations in return for playing a song of their choice, which is bound to attract more passers by. It could ultimately pay for itself in this way. Certainly we will keep SPS national updated on future developments.