



# SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

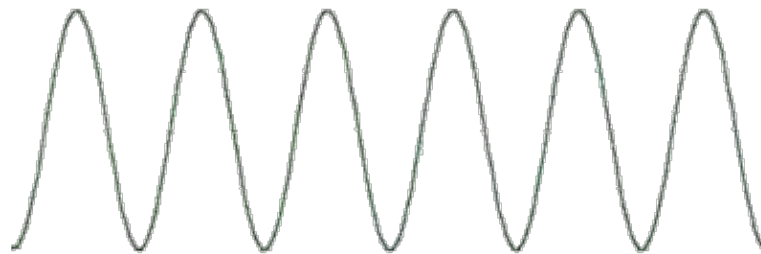
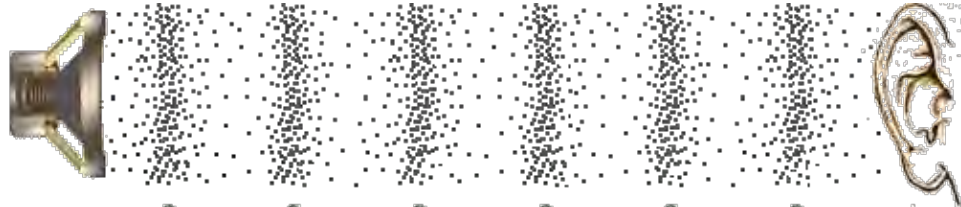
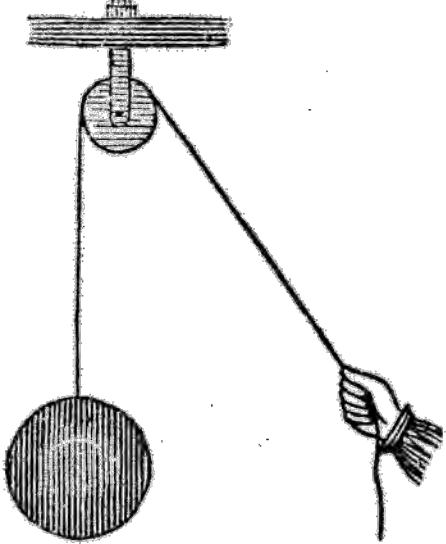
## Marsh White Award Report Template

*Instructions: Please complete each section after reading the purple text describing what should be in that section. Then delete the purple text.*

Project Proposal Title	From Cold Milk in the Morning to Reading Light at Night: Our Encounters with Physics Through the Day
Name of School	Cleveland State University
SPS Chapter Number	1247
Project Lead (name then email address)	Janna Mino, minojanna@gmail.com
Additional Project Leads (two lists: names then emails)	Krista Freeman, k.g.freeman22@gmail.com Jim Pitchford, j.e.pitchford@gmail.com Chris Mentrek,
SPS Chapter Advisor	Dr. Kiril Streletzky
Total Amount Received from SPS	300.00
Total Amount Expended from SPS	297.29

## Summary of Award Activities

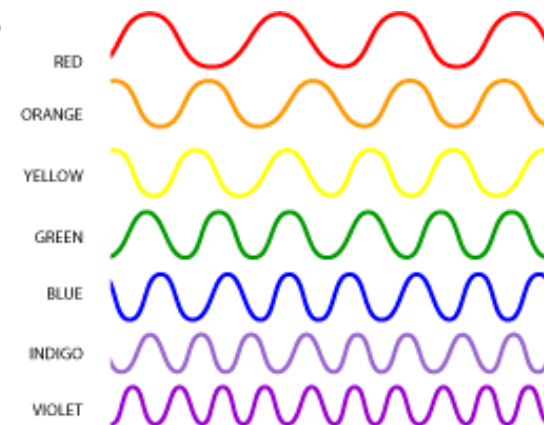
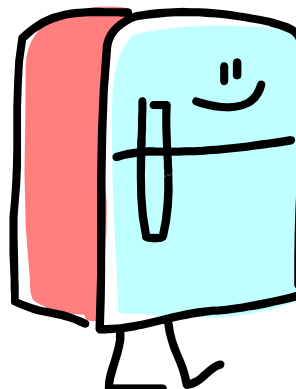
The Cleveland State University (CSU) physics students will use the award to continue our outreach program with a local public school. This year our program will explore the way school-aged kids encounter physics every day: from refrigeration of milk at breakfast to switching off reading lights at night.



# Physics Outreach at Campus International School

Organized and presented by the students, faculty and staff  
of the Department of Physics at Cleveland State University

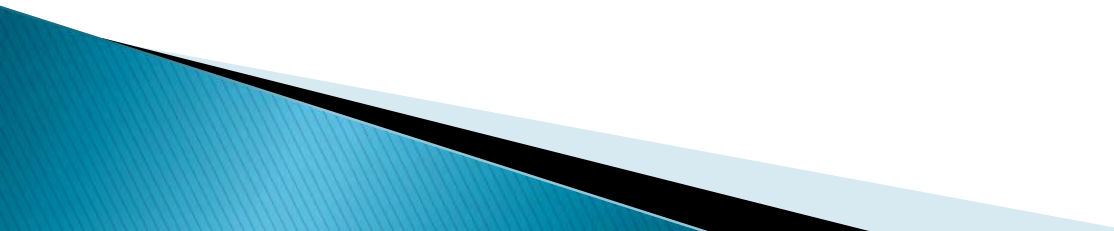
Funded by the Marsh White Award from the National  
Society of Physics Students



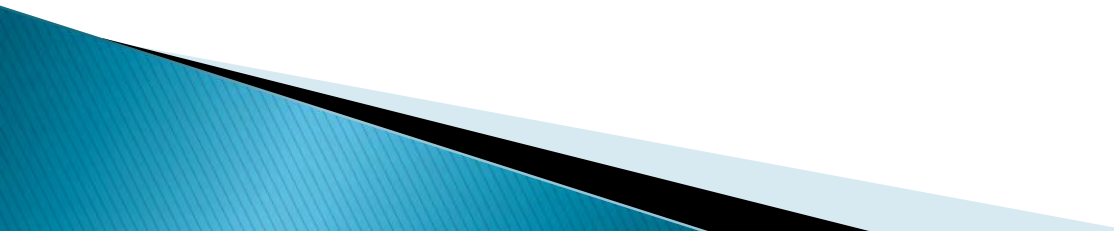
# After School Physics Club

- ▶ **Who?** Members of the Cleveland State University chapter of the Society of Physics Students and after-school students at Campus International School, a public school in Cleveland, OH
  - ▶ **What?** Fun and interactive activities with a different physics theme each month
  - ▶ **Where?** Campus International School, a local public school following the International Baccalaureate Primary Years Programme
  - ▶ **When?** After school once every month (since January 2011) during the academic year
  - ▶ **Why?** To get young students excited about science and higher education by nurturing relationships through learning
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# 2013–2014 Physics Themes

- ▶ Radiant Rainbows
  - ▶ Dry Ice Investigators
  - ▶ Making Simple Machines Work for Us!
  - ▶ Is Your Refrigerator Running? Let's Learn How!
  - ▶ Can You Hear Me Now? Exploring Sound Waves
  - ▶ 3...2...1...BLAST OFF! A Rocket Adventure
- 

# Radiant Rainbows

- ▶ We experimented with many ways to make and view rainbows both indoors and out!
  - ▶ Through experiments, we learned that the ingredients for an outdoor rainbow = Sunlight + Water droplets in the air + Eyeballs + The right place to stand
  - ▶ We learned that white light is made of all the colors of the rainbow
  - ▶ Each student made a paper spectroscope and used it to break white light into its colors
- 



# Radiant Rainbows



# Dry Ice Investigators

- ▶ What IS dry ice? How cold is it? Why does it take so long to melt? What makes it smoke? How can we melt it?
- ▶ We answered these questions by:
  - Measuring the temperatures of dry and wet ice
  - Comparing the weight of dry ice “smoke” to air
  - Using dry ice “smoke” to blow up balloons
  - Performing a chemistry experiment that proves dry ice smoke is actually carbon dioxide!

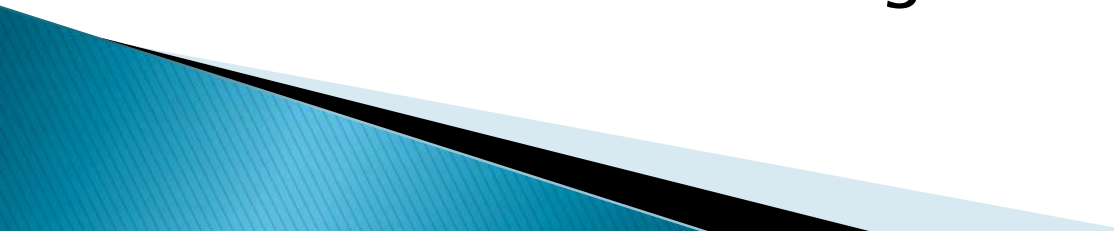


# Dry Ice Investigators!





# Making Simple Machines Work for Us!

- ▶ We explored several simple machines and discovered how they could help make our lives more...well, simple!
  - ▶ We balanced forces with a force table—we learned about equal and opposite forces too
  - ▶ We explored how an Atwood Machine and a system of pulleys works
  - ▶ Need a third arm? We've got you covered!
  - ▶ Even the smallest of us could lift a heavy bucket of sand using a clever pulley design!
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# SIMPLE MACHINES!



# Is Your Refrigerator Running?

- ▶ Have you ever wondered how your fridge works? Here, we took a look inside everyone's favorite home appliance and found physics!
  - We learned how cooling coils in a fridge rely on the relationship between temperature and pressure
- ▶ Different materials have different temperatures—we felt how cool rubbing alcohol feels on our skin compared to water or air!
- ▶ We explored different ways to keep ice frozen longer. Hot metal melts ice quickly while Styrofoam keeps it frozen longer.
- ▶ Phase transitions explain why ice melts into water and water turns into steam—we observed phase transitions with the help of liquid nitrogen!



REFRIGERATION



# Can You Hear Me Now?

- ▶ We explored the physics of sound—our favorite noisy day!
- ▶ We learned that sound is a longitudinal (or squishy) wave that has a vibration as its source
  - We made homemade straw oboes—when you blow into the cut end you create vibrations, which create a really funny noise
- ▶ Like all waves, sound has direction. It travels until it bounces off of (or is absorbed by) an object in its path!
  - Some objects reflect sound well, and some absorb it. We experimented with sound waves traveling through, bouncing off of, or being absorbed by many different materials
- ▶ Sound waves have nodes and antinodes—more nodes means a higher pitch! We explored this concept by playing great music with a set of tubes of different lengths
- ▶ We learned how resonance depends on pitch with a wave generator and different hollow objects, like a drum





Makin' Sound Waves!



# 3...2...1...Blast Off!

- ▶ This end-of-the-year lesson sent us all rocketing into space on homemade rockets!
- ▶ We learned the word thrust, and realized that rockets rely on thrust to power them into space
  - We used balloons to explore thrust—when the air moves one way, the balloon moves the opposite way. We used this concept to send a balloon powered rocket ship on a mission!
- ▶ We learned about rocket stability and how important it is for space exploration
  - We can improve the stability of a balloon rocket by controlling the thrust—adding a straw to the end directs the thrust so the balloon rocket moves in a straight line
- ▶ We built our own paper rockets and launched them from a launch pad. We learned that our rockets couldn't have any air leaks, or they wouldn't fly! The rockets also needed fins and some added weight in the nose for stability



3.2.1

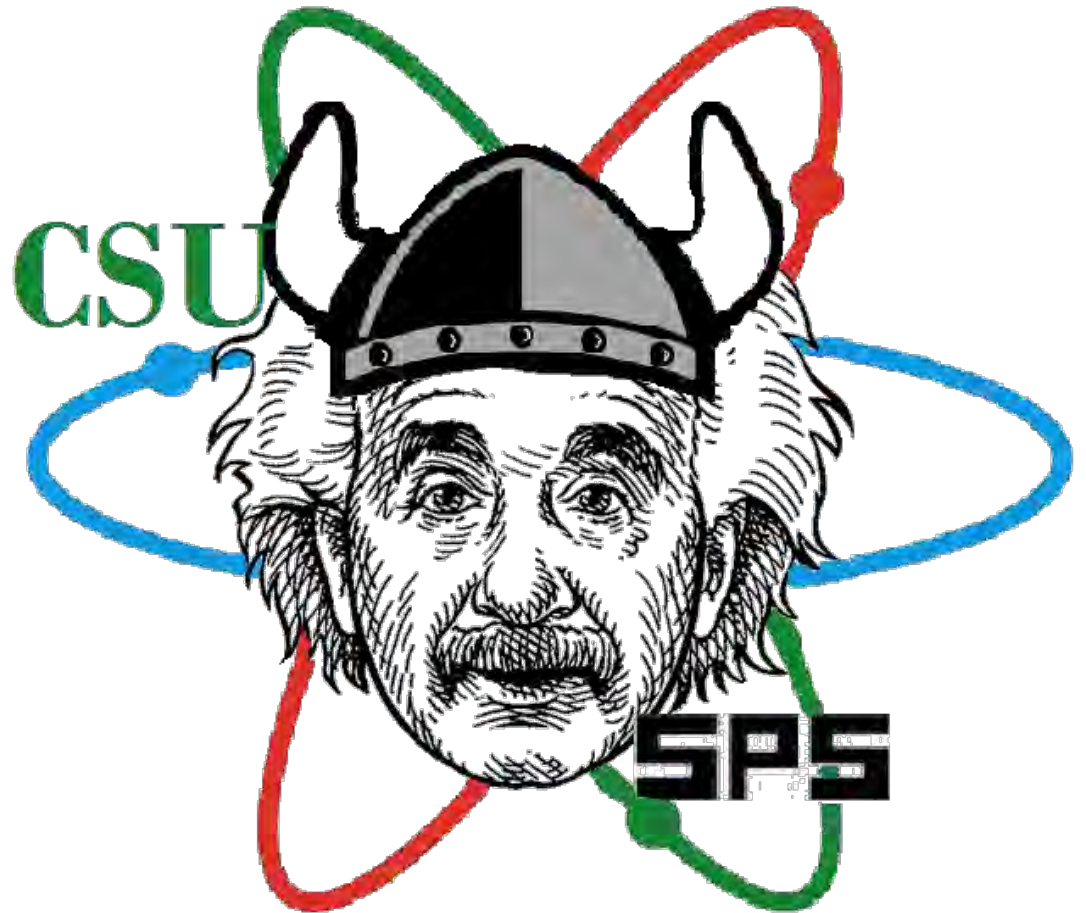


BLAST OFF!



# 2013-2014 Participants

- Dr. Kiril Streletzky
- Krista Freeman (Outreach Coordinator)
- Chris Mentrek
- Jim Pitchford
- Marie Blatnik
- Richard Kolk
- Liz Brochu
- Janna Mino
- Grace Gaeckle
- Tara Peppard





### Key Metrics and Reflection

Who was the target audience of your project?	<b>Elementary school kids</b>
How many attendees/participants were directly impacted by your project? Please describe them (for example “50 third grade students” or “25 families”).	<b>50 afterschool program K-5 kids at Campus International School (CIS)</b>
How many students from your SPS chapter were involved in the activity, and in what capacity?	<b>6</b>
Was the amount of money you received from SPS sufficient to carry out the activities outlined in your proposal? Could you have used additional funding? If yes, how much would you have liked and how would the additional funding have augmented your activity?	<b>The money paid for the bulk of expenses. However, Physics Dept “in kind” contributions were critical especially for the second (Fall) semester of outreach. Without “in kind” support” another \$300-500 would be needed</b>
Do you anticipate repeating this project/activity/event in the future, or having a follow-up project/activity/event? If yes, please describe.	<b>Yes. The outreach program has been successful for the last 4 years and should be continued.</b>
What new relationships did you build through this project?	<b>The great relationship with CIS and its kids who remember SPS outreach team and wait for its return from semester to semester.</b>
If you were to do your project again, what would you do differently?	<b>Involving more of current CSU students; better separation of activities between younger (K-3) &amp; older kids (4-6 grades)</b>

### Press Coverage (if applicable)

<http://www.csuohio.edu/news/csu-students-engage-campus-international>

## Expenditures

### Expenditure Table

Item	Cost
Building materials for simple machines (wood, pulleys, rope, bolts and washers, etc)	52.97
Dry Ice supplies, compressed air cans, gift thermometers, bike-pumps	125.00
DVDs, skotch tape, scissors, jello, pump misters, constrcution paper	75.00
Air Pump, construction paper, baloons, rope	44.32
<b>Total of Expenses</b>	<b>297.29</b>