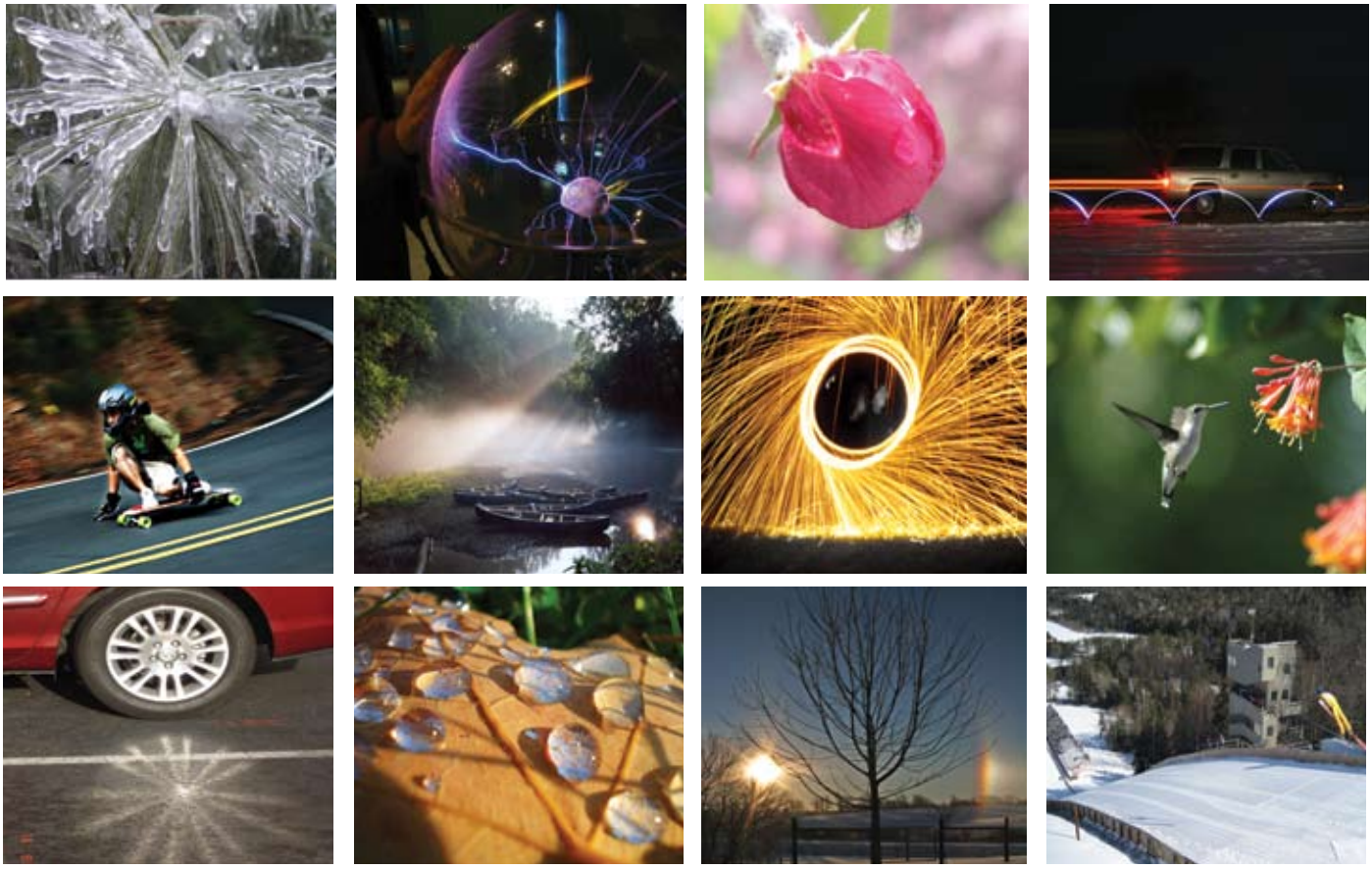


2009 AAPT Physics Photo Calendar

The photos in this calendar are all from the top 100 in the 2008 AAPT High School Physics Photo Contest. We would like to thank all the students who entered and all the teachers who encouraged them!

Also thank you to Mary Winn and her team for organizing the contest each year. And thank you to Vernier Software Inc. for sponsoring the prizes for the contest.

The photos were judged this past summer during AAPT's Summer Meeting in Edmonton, Alberta.

Craig Rovito
Colonie Central High School • Albany, NY • Teacher: Michele Cannistraci-Famoso

Cold Physics

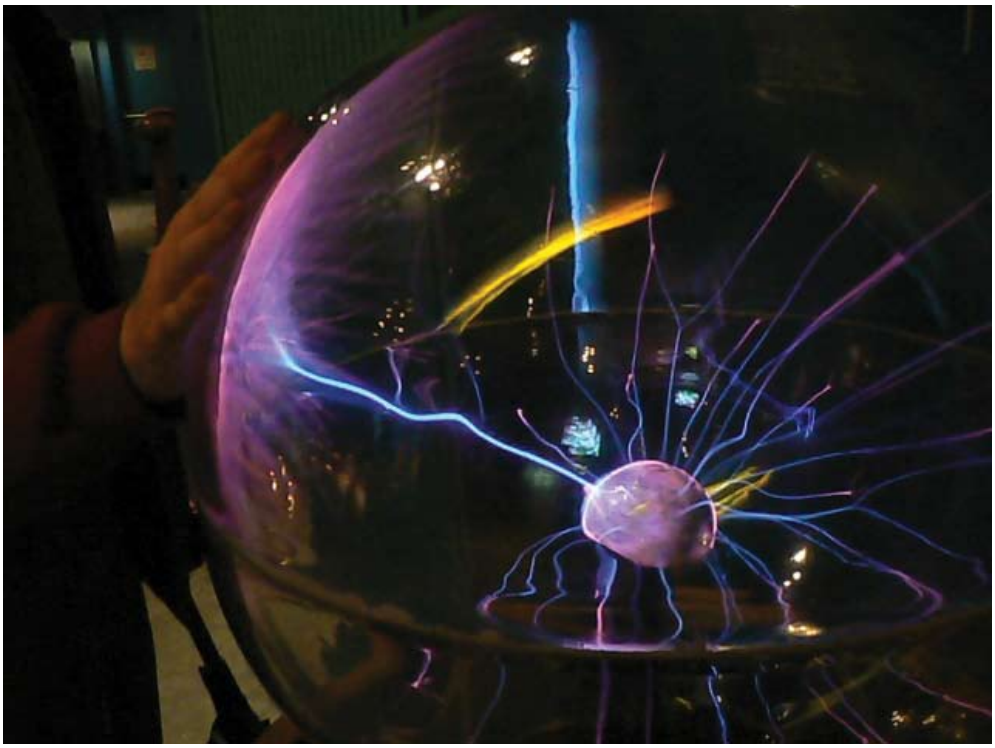
This photo is of a pine tree after a snow storm. The needles have each been separately incased in a shell of ice. Gravity has caused the water to run down the tree's needles and freeze around them. Once the needles were fully iced over, the water continued to run down the pine tree. Thus, at the end of each needle, there is a small icicle forming. The electrostatic forces between the newly formed ice and the water raining down caused the icicles to progressively elongate. Without the friction between the ice and the water droplets, the water would not have been able to stay on the tree long enough to freeze. The combination of friction and gravity aided the formulation of the icicles. You can see from the way each icicle is directed, almost perpendicular with the ground, the way in which the force of gravity is acting.

AAPT PHYSICS EDUCATION

January 2009

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1 New Year's Day	2	3
4 ◐	5	6	7	8	9	10 ○
11	12	13	14	15	16	17 ◑
18	19 Martin Luther King Day	20	21	22	23	24
25	26 ●	27	28	29	30	31

Jan. 19–23: ***$F_{net} = ma$* Physics Olympiad Exams Administered**



Andrew Shigo
Delaware Valley Regional High School • Frenchtown, NJ • Teacher: Patrick Callahan

Plasma Wave

This picture displays a plasma ball reacting to the touch of a hand. These devices work in a combination of basic and advanced physical principles of electricity. The orb consists of several gasses contained at a low pressure within the sphere, an electrode in the middle, and an alternating current traveling across the electrode. As this current travels through the electrode, small plasma filaments travel from this center to the glass sphere surrounding it. The glass acts as an insulator between the filaments and the conductor on the outside. The plasma filaments follow the electric field lines of the sphere; touching your hand to the glass causes a discharge. Since your hand is the best conductor to ground, the charges in the plasma filament travel to your hand attempting to reach ground state. A current then occurs through the plasma filament, but is stopped by the glass insulator. The electromagnetic field created by the current affects the plasma filaments and the electric field. The wide area of plasma against the glass occurs because this sphere is larger than normal.

FEBRUARY 2009

AAPT PHYSICS EDUCATION

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2 ◐	3	4	5	6	7
8	9 ○	10	11	12 AAPT Meeting in Chicago, Feb. 12–16	13	14
15	16 ◑ President's Day	17	18	19	20	21
22	23	24 ●	25	26	27	28

Feb. 12-16: **AAPT Winter Meeting in Chicago, in conjunction with AAAS Annual Meeting**

Yuntao Bai
A.Y. Jackson Secondary School • Toronto, Ontario • Teacher: Sai Chung

Water

A water droplet adheres to the tip of a flower. Dipolar attractions of water molecules induce a strong surface tension at the air-water interface. As a result, these molecules form a bead on the flower's surface. The droplet behaves like a convex lens, producing an inverted image of a tree behind it. (This photo won Honorable Mention in the Natural Category of the 2008 H.S. Physics Photo Contest.)

AAPT PHYSICS EDUCATION

March 2009

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4 ◐	5	6	7
8 Daylight Saving Time Begins	9	10 ○	11	12	13 PTEC Conference March 13–14 Pittsburgh, PA	14
15	16 APS March Meeting March 16–20 Pittsburgh, PA	17	18 ◑	19 NSTA National Conference March 19–22 New Orleans, LA	20	21
22	23	24	25	26 ●	27	28
29	30	31				

Charles A. Grimmett
Amherst Steele High School • Amherst, Oh • Teacher: Charles Deremer

Nighttime Cycloid

Named by Galileo in 1599, a cycloid is the path that a point on the edge of a circular wheel follows as the wheel rolls along a straight line. This photo is a long exposure taken at night. I attached an LED to the edge of the tire, opened the camera's shutter, then had my dad drive the vehicle in a straight line until it reached where I knew the edge of the frame was. In order for the vehicle to show up, I had to illuminate it for about 10 seconds with a spotlight. (This photo won 2nd place in the Contrived Category of the 2008 H.S. Physics Photo Contest.)

April 2009

AAPT PHYSICS EDUCATION

Sun	Mon	Tue	Wed	Thu	Fri	Sat
April 6–17: AAPT PhysicsBowl Exam Period			1	2 ◐	3	4
5	6	7	8	9 ○	10	11
12 Easter	13	14	15 New Faculty Workshop Nominations due	16	17 ◑	18
19	20	21	22 Earth Day	23	24 ● Six Flags America Physics Day, Mitchellville, MD	25
26	27	28	29	30		

Raphael Rodriguez
Punahou School • Honolulu, Hawaii • Teacher: Michael Hu

What a Drag

Downhill skateboarding, or speedboarding, is a growing sport around the world. The picture of a skateboarder riding down a hill shows the physics concept of drag. Air resistance is the enemy in speedboarding because it is a constant force that significantly slows the rider down. To counteract it, skateboarders get into a "tuck" to minimize their frontal area. In doing this, they greatly reduce their drag coefficient, as noted in the drag equation by Lord Rayleigh, and their reference area (the plane perpendicular to the direction the object is moving). By reducing these two variables, they can increase their top speed on a hill. This concept is clearly demonstrated in the streamlining of automobiles, airplanes, boats, etc. in wind tunnels.

AAPT PHYSICS EDUCATION

MAY 2009

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1 ◐ APS Spring Meeting May 2–5 Denver, CO	2
3	4	5 U.S. National Teacher Day	6	7	8	9 ○
10 Mother's Day	11 International Science Engineering Fair May 10-15, Reno	12	13	14	15 Team America Rocketry Challenge Finals, The Plains, VA	16
17 ◑	18	19	20	21	22	23
24 ●	25 U.S. Memorial Day	26	27	28	29	30 ◐
31						

May 15: **H.S. Photo Contest entries due**

Alexis Blanch
Academy of the Sacred Heart • New Orleans, LA • Teacher: Stephen Collins

A Scattered Sun

Here, the sunlight is hitting a patch of fog, and the light is reflecting off the particles in the fog, allowing it to be seen. This demonstrates diffuse reflection, which happens when a wave hits an uneven surface and the reflected image is distorted. In diffuse reflection, rays that hit the surface parallel to one another are then reflected in an erratic pattern. This is what causes the reflection of the trees in the water to appear blurry. (This photo won 1st place in the Natural Category of the 2008 H.S. Physics Photo Contest.)

June 2009

AAPT PHYSICS EDUCATION

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7 ○	8	9	10	11	12	13
14	15 ◑	16	17	18	19	20
21 Father's Day	22 ●	23	24	25 AAPT New Faculty Workshop, College Park, Md June 25-28	26	27
28	29 ◐	30				

Christopher Lejeune
Robinson Secondary School • Fairfax, VA • Teacher: Melissa Booker

Steel Wool Sparks

I created this picture using a piece of steel wool, a lighter, and a shoelace. I tied the steel wool to the end of the shoelace and then lit one end of the wool. By swinging it in a circular path, the increased airflow would ignite the rest of the steel wool to produce the sparks shown in the picture. The combusted steel wool would fly off in a path tangent to the circle. This picture displays the velocity vector of centripetal force as well as the force of gravity affecting the trajectory of the sparks.

JULY 2009

AAPT PHYSICS EDUCATION

Sun	Mon	Tue	Wed	Thu	Fri	Sat
***July 25–29:* AAPT Meeting in Ann Arbor, MI**			1	2	3 U.S. Independence Day	4
5	6	7 ○	8	9	10	11
12	13	14	15 ◑	16	17 AAPT/PTRA Summer Institute, July 18–24, Univ. of Michigan Ann Arbor	18
19	20	21 ●	22	23 Advanced Labs Topical Conference, July 23–24, Ann Arbor, MI	24 CHAOS Conference July 24–26 Woods Hole, MA	25
26 AAPT Summer Meeting July 25–29 Univ. of Michigan Ann Arbor	27	28 ◐	29	30	31	

Steven Slobodecki
Glenbard North High School • Carol Stream, IL • Teacher: Dan Rubino

Humming and Hovering

Physics can be found all through the rare and exotic hummingbird. Their rapid and constantly fluttering wings beat so fast (50-200 beats per second) that a vibrating sound is created. The hummingbird produces nearly a watt in one second of beating. The intensity of the vibrating humming sound is based on the size of the bird which determines the size of the wave frequencies created distinguishing the volume of the humming. The rapid movement of the wings makes the hummingbird appear it's floating when in actuality the bird is flying.

August 2009

AAPT PHYSICS EDUCATION

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5 ○	6	7	8
9	10	11	12	13 ◑	14 Nominations due for Nov. New Faculty Workshop	15
16	17	18	19	20 ●	21	22
23	24	25	26	27 ◐	28	29
30	31					

Jamie Bachman
The Walker School • Marietta, GA • Teacher: Sandra Rhoades

Specular vs. Diffuse Reflection

This photo depicts a reflection of car rims on asphalt, an uneven surface. Since asphalt is granular, diffuse reflection would normally occur, reflecting the light in many directions. Interestingly though, the reflection produces a mirror-like image, as from a smooth surface. Because the photo was taken when the Sun came out directly after rain, the asphalt was still wet. Water filled the uneven crevices of the pavement, creating a smooth surface. Therefore, when the Sun hit the rims and reflected off of the wet pavement, specular reflection occurred, producing the spiral image of the rim. (This photo won Honorable Mention in the Natural Category of the 2008 H.S. Physics Photo Contest.)

September 2009

AAPT PHYSICS EDUCATION

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4 ○	5
6	7 Labor Day	8	9	10	11 ◑	12
13	14	15	16	17	18 ●	19
20	21	22	23	24	25	26 ◐
27	28	29	30			

Mrinalini Modak
Fayetteville-Manlius High School • Manlius, NY • Teacher: Joshua Buchman

Drops of Sky

In this image, the blue reflection seen within the water droplets is actually a reflection of the blue sky above. The blue light is reflected because the water has a different index of refraction than its surroundings (the leaf and the air). The blue sky light is the result of the white light from the Sun being scattered by the molecules present in the atmosphere. Shorter wavelengths are scattered much more than longer ones, and so we perceive the sky as blue. The sphere-like shape of each droplet causes it to act as a lens, magnifying the leaf beneath it. (This photo won 3rd place in the Natural Category of the 2008 H.S. Physics Photo Contest.)

October 2009

AAPT PHYSICS EDUCATION

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4 ○	5	6	7	8	9	10
11 ◑	12	13	14	15	16	17
18 ●	19	20	21	22	23	24
25 ◐	26	27	28	29 NSTA Area Conf. Oct. 29–31 Minneapolis, MN	30	31

Casey Brown
Northfield High School • Northfield, MN • Teacher: Rebecca Messer

Sundog

Nature is filled with countless wonders. Some are happenings that take place everyday but are looked at in the right light. This photo shows a "Sundog." Generally, Sundogs happen when the Sun is near the horizon. The Sun's light passes through hexagonal-shaped ice crystals and is then refracted so that the observer sees a spectrum of light near the Sun. (This photo won 2nd place in the Natural Category of the 2008 H.S. Physics Photo Contest.)

November 2009

AAPT PHYSICS EDUCATION

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1 Daylight Saving Time Ends	2 ○	3	4	5	6	7
8	9 ◑	10	11 U.S. Veteran's Day	12 NSTA Area Conf. Nov. 12–14 Ft. Lauderdale, Fl	13 New Faculty Workshop, Nov. 12–15, College Park, MD	14
15	16 Registration for U.S. Physics Team ● begins	17	18	19	20	21
22	23	24 ◐	25	26 Thanksgiving	27	28
29	30					

Dmitriy Tsenter

Colonie Central High School • Albany, NY • Teacher: Michele Cannistraci-Famoso

The Physics Behind Ski Jumping

This picture was taken at the Olympic ski jumping complex in Lake Placid, NY. Ski jumping has always been one of my favorite Olympic events, which is why I took this picture. There is a lot of physics required in being a successful ski jumper. One aspect of physics that is used in ski jumping is the transfer of energy. At the top of the jump, the skier has all gravitational potential energy. As he comes down the ramp, that energy transforms into kinetic energy at the end of the ramp. When taking off at the end of the ramp, the skier bends his body forward so that there is less surface area for the air to hit, which in turn reduces the amount of drag. Since drag cannot be completely eliminated, the rider will eventually lose most of his mechanical energy and make a landing.

AAPT PHYSICS EDUCATION

DECEMBER 2009

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2 ○	3 NSTA Area Conf. Dec. 3–5 Phoenix, AZ	4	5
6	7	8 ◑	9	10	11	12
13	14	15	16 ●	17	18 Registration Deadline for U.S. Physics Team	19
20	21	22	23	24 ◐	25 Christmas Day	26
27	28	29	30	31 New Year's Eve ○		