

S³A

Saturday Science Series at Argonne National Laboratory

Fall 2002

**Saturday October 5th
Proteins-- Molecular Machines!**

Dr. Lee Makowski, Biologist

**Saturday November 2nd
Visit the Advanced Photon Source!**

Dr. Liz Moog, & other APS staff

**Saturday December 7th
Symmetry Magic!**

Dr. Elaine Schulte, Physicist

**Saturday January 11th
From Light Bulbs to Lasers!**

Dr. David Gosztola, Chemist

S³A Overview:

The Saturday Science Series at Argonne is an exciting series of interactive presentations on hot topics in science, math, engineering, & technology especially designed for 6th, 7th & 8th grade students and their parents or mentors. Participants interact with Argonne scientists & engineers, learn about their most exciting work, and find out what it takes to become a professional in science.

Argonne makes a special effort to select S³A speakers who can connect with a young audience, convey the excitement of what they do professionally, and actively involve the audience in their presentations.

All sessions are 9:30-11:00 AM.

Oct, Dec & Jan meetings in the Argonne Information Center
Nov meeting is in the APS building

Use Argonne's main entrance just south of I-55 on Cass Ave.

Why S³A?

*Many students think science is boring and/or difficult.
Are you tired of memorizing names, facts, & definitions?*

Real science is more than just facts and definitions. Real science is exciting, challenging, sociable... and FUN! At S³A, students and parents get a taste of real science-- find and share science's humor, anticipation, excitement, and satisfaction. At S³A, students and parents interact as colleagues with some of the nation's premiere scientists. Sign up for S³A-- find out how scientists think & work, learn new stuff, do some science sleuthing of your own!

Students:

Science-interested students are nominated for S³A by their Science or Math teachers. Only 30 of the nominees are selected to be participants. Teachers may nominate no more than one girl and one boy from each school.

*A parent, mentor, or adult sponsor must attend.
Please do not bring uninvited siblings.*

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S³A Benefits:

- S³A encourages students to consider science, math, engineering & technology careers at an important time in their schooling.
- S³A opens students' eyes to "Cool" science, math, engineering & technology developments, to scientists and science careers, and student opportunities at Argonne.

S³A Program content:

- S³A speakers present engaging aspects of their work and how it relates to people & life in the US & World.
- Speakers talk about their own careers-- how they became interested, schooling, advanced degrees, research projects, etc.
- Interactive hands-on activities add to the adventure, engagement, and excitement!

for information, email fhartline@dep.anl.gov or phone 630-252-5704

*S³A is a
LIMITED ENROLLMENT PROGRAM
Please return this form as quickly as possible to
the Science or Math Teacher who nominated you.*

S³A

Saturday Science Series at Argonne

Application Form

Fall 2002

Student's Name: _____ Grade (6,7, or 8): _____
 Nominating Teacher: _____
 Teacher's phone or email: _____
 School: _____
 District: _____
 Parent or guardian name(s): _____

*I (we) understand that the S³A program is limited to 30 students and their parent(s), mentor, or sponsor,
 and that we will be contacted to confirm our enrollment;
 I (we) understand that S³A is especially for students who are interested in science, math or technology;
 I (we) understand that a parent, mentor, or adult sponsor must accompany our child
 and participate in the S³A event.*

Parent or guardian signature: _____

Fall 2002 --- Saturday Science Series at Argonne --- S³A

A bit about the programs...

Saturday October 5th 9:30-11:00 AM

Proteins-- Molecular Machines! **Dr. Lee Makowski, Biologist**

Proteins are not just what your parents tell you to eat more of. Proteins are complex molecular machines that carry out most of the major functions of your body. Every time you twitch a finger, digest an M&M, watch a fly ball, or have a deep thought, millions of proteins are working together to make it happen!

To understand a complex machine, you have to start with a picture of the machine. Imagine trying to understand how your car's engine works if you didn't know what it looks like. It's hard enough to understand if you do know. At Argonne, scientists (and an amazing robot) work day and night to determine the structures (or pictures) of the proteins that make your body work. These pictures form the basis of novel strategies to cure disease.

In this session we'll discuss how protein "machines" work, and how we figure out how they work.

Saturday November 2nd 9:30-11:00 AM

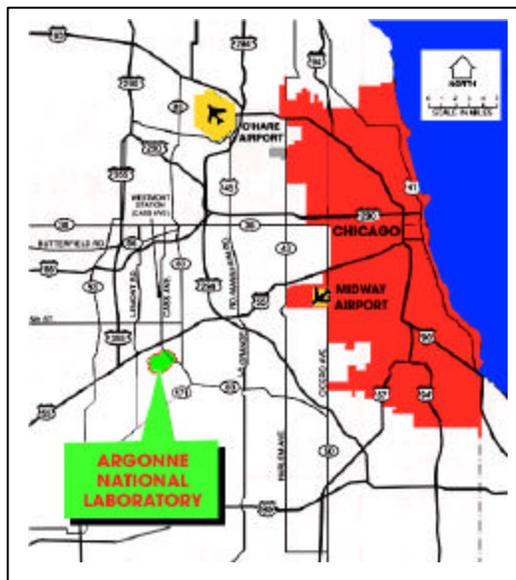
Visit the Advanced Photon Source! **Dr. Liz Moog, & other APS staff**

For this session, we go "inside the fence" to Argonne's internationally famous Advanced Photon Source (APS), where scientists use super-bright x-ray light beams to study materials, and molecules in action. After a brief introduction, we'll head to the top floor to look out over the APS facility, before descending to the *viewing gallery*, for a bird's eye view of the experimental hall. Then we break into groups, each with its own guide, to visit key parts of the APS. Stops include the experiment hall & hutches, vacuum and magnet demos, the magnetic measurement room, and the main control room.

Few people have such an opportunity to see the inner workings of the APS. This will be a real treat.

Finding Argonne National Lab

Use Argonne's main entrance just south of I-55 on Cass Ave. S³A meets in the Argonne Information Center (Bldg 224) just outside the Security Gate, except... the Nov. 2nd session will be inside the gate. Parents or mentors should pick up a map for Nov. 2nd and sign up for the required gate-pass at the Oct. 5th session.



S³A is a

LIMITED ENROLLMENT PROGRAM
for science-interested students

Selected students will be notified by their
nominating teacher!

for information, email fhartline@dep.anl.gov or phone 630-252-5704

Saturday December 7th 9:30-11:00 AM

Symmetry Magic! **Tools for Describing the Universe** **Dr. Elaine Schulte, Physicist**

What comes to mind when you hear the word "symmetry"? Would you believe that symmetries are all around you and that scientists use them as powerful tools to organize and understand the universe? Three very important symmetries are used by physicists to describe everything from bouncing balls to particles we can't even see-- parity (the mirror image), charge conjugation (changing a "particle" into an "anti-particle"), and *time reversal*. Learn how an experiment in time reversal could turn particle physics upside down, and send theorists back to the drawing board!

Saturday January 11th 9:30-11:00 AM

From Light Bulbs to Lasers! **Dr. David Gosztola, Chemist**

Light is a *very important* tool that scientists use in all kinds of research, from understanding atoms to exploring galaxies. Light comes in many useful "colors": x-rays, ultraviolet, visible, and infrared light, and from many sources: LEDs, lamps, lasers, and the APS. In this session you'll learn NEAT things about light and its scientific uses-- from reflection, refraction, and absorption to diffraction, fluorescence, laser ranging, holograms, and thermal imaging. We'll have discussions and eye-opening demonstrations, as well as hands-on activities exploring different types and sources of light, and their scientific uses. You'll go away enlightened!

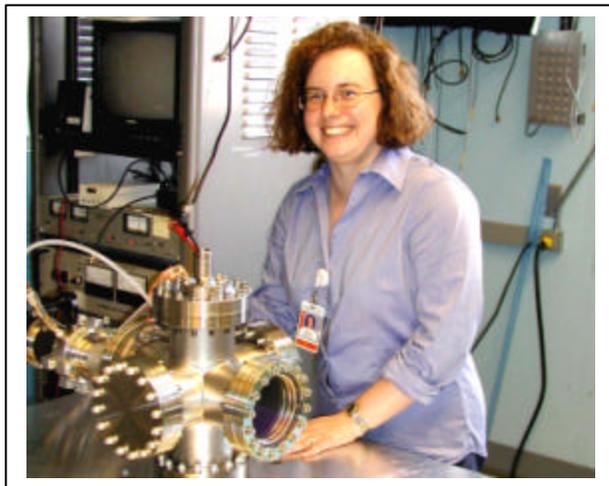
A bit about the scientists...

Visit S³A online at <http://www.dep.anl.gov/s3a>

Dr. Elaine Schulte

Argonne physicist Elaine Schulte received her Ph.D. just last year. Now she is setting up an exciting experiment to test time-reversal invariance-- whether things behave the same when "the movie is played backwards." Elaine comments "Exploring the symmetries of nature are a great way to deepen our understanding of the universe. [and] has some interesting consequences for particle physics." Last spring, Schulte received the 2002 Luise Meyer-Schutzmeister award given to an outstanding doctoral student in physics by the Assoc. for Women in Science.

Dr. Elaine Schulte repairs a calcium oven in her lab.

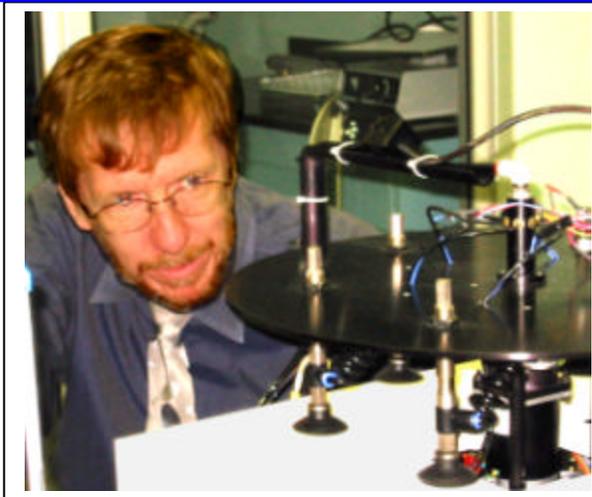


Dr. David Gosztola

Dave came to Argonne's Chemistry Division as a young postdoctoral associate, later becoming a staff scientist there. His research involves the application of laser-based techniques to study the interaction of light with molecules. He has used lasers to study molecules at electrode surfaces as well as molecules that mimic photosynthesis. Currently he is developing a laser with a peak power of more than a *terawatt* (a million million watts) to study high-energy interactions of molecules. David has published many scientific articles and holds a patent for a molecular switch which is turned on and off by laser light. He has received Argonne's Pacesetter and Director's awards as well as an R&D 100 award, and has given educational presentations for students at schools and at Argonne for the Women in Science program.



Dr. Dave Gosztola works with the laser optics in his lab



Dr. Lee Makowski inspects part of Bioscience's protein cloning robot



Dr. Lee Makowski

Dr. Makowski "discovered" science in middle school. Science had the irresistible potential to explain almost anything! In college, he majored in Physics, and in graduate school, in electrical engineering. Then Lee discovered that he really wanted to understand **life**: how it works, what goes wrong when you get sick, how to fix things when they go wrong. He's been a molecular biologist ever since. A leader in international community of scientists doing structural analysis of proteins, he is now the Division Director of Biosciences at Argonne.



Dr. Liz Moog and one of her "toys"-- a magnetic "undulator" device .

Dr. Liz Moog

Liz is a physicist and group leader at Argonne's Advanced Photon Source. In middle school and high school she particularly enjoyed and did well in math & science, and in college, was attracted to physics. "I found experimental physics particularly appealing because there are all sorts of fascinating toys (sometimes called 'scientific equipment') to play with. Understanding what the apparatus does... appealed to me, as did figuring out how to build new apparatus to do new things." Liz finds some truth in the joke that scientists are "children...whose toys have gotten more expensive." Now she gets to design and build big "toys" for the APS: arrays of magnets called wigglers and undulators that help produce the intense x-ray beams for scientists to use in their research. Liz has a husband and a 13-year-old daughter, and plays French horn in her community's orchestra and band.