



"A.T.O.M.Science

Club FOR kids"

Visit to UC Berkeley

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Event Report

Introduction

The ANS student section of the University of California, Berkeley hosted the "A.T.O.M.S. (Adventures Through Open Minds Science) club for kids" on February 24, 2007 for a day of fun-filled educational activities. Approximately 80 students between the ages of seven and twelve attended the event, along with one or two parents each and some with siblings much younger than seven.

The ATOMScience club is a year-round extracurricular club founded and directed by Leslie Buchalter, who is dedicated to teaching children about science in a fun, playful way. With her effective teaching methods and contagious enthusiasm, Leslie teaches children fundamental scientific concepts by using "kid language" and associating usually difficult ideas with something even the very young children can understand and relate to. For one of many examples, the children are taught the existence and properties of fundamental particles by representing three quarks in a nucleon by three Nerds in a squashed-up jelly bean, where the colors of the candy depends on the properties of the quarks. The children's solid understanding of fundamental principles continuously proves the success of her teaching style.

Event Summary

The day started with a pizza lunch at the Bear's Lair on the south side of campus followed by a walk across campus to Etcheverry Hall. The kids were divided into five groups, Hydrogen, Xenon, Uranium, and Plutonium (the Plutonium group was the most popular) and were outfitted with Nuclear Engineering department t-shirts.

Five rooms had been set up with a variety of educational activities as described below. Starting in different rooms, every group visited each room in series for half-hour sessions. The day culminated in a "graduation" ceremony where each child received a certificate from Nuclear Engineering department chair Jasmina Vujic conferring upon each the

title of "Junior Nuclear Engineer." Professor Vujic invited everyone to apply to Berkeley and quite a few promised to return.

Sessions

Information Session

Packets of informative material provided by ANS and nuclear science posters were handed out to the kids. Profiles of nuclear engineering students written in kid-friendly language were provided to students. (See Appendix.) Students were on hand to answer questions ranging from "How do we know what uranium-235 breaks up into?" to "Does juice come out of plutonium when it decays?"

Radiation I

This room featured two stations: a radiation station and a cloud chamber station. The radiation station featured household radioactive items (smoke detector, Fiesta ware) and a Geiger counter. Students were introduced to the concepts of time, distance, and shielding. Students participated in a short experiment demonstrating the effects of distance on radiation dose. Students collected data using the Geiger counter and plotted the results. After the radiation station, students moved to the cloud chamber station that featured six cloud chambers on loan from Joel Cehn of the Health Physics Society. Students set up the cloud chamber and observed particle tracks.

Radiation II

This room featured two activities: a demonstration of radioactive decay and half-life, and a decay chain activity. The radioactive decay activity had students tossing M&Ms into a box and then removing "up side down" M&Ms. Students logged and plotted the number of remaining M&Ms to demonstrate the concept of half-lives. For the decay chain activity, entitled "One Big Happy Family", each student was assigned a radionuclide identity and provided with balloons or plastic balls to represent either an alpha or beta particle, respectively, and a can of silly string to represent gamma rays. While throwing their beta or alpha particles and emitting gamma rays, students competed to find and link arms with their decay daughter and parent to form decay chains.

Fission

This room featured a brief introduction to fission and nuclear power plants, a mousetrap chain reaction demo, a mock-up nuclear reactor, and a human chain reaction activity. The brief introduction utilized various animations to introduce the concepts of fission and nuclear power plants. The mousetrap chain reaction demo used mousetraps and ping-pong balls to vividly illustrate a chain reaction. The mock-up nuclear reactor consisted of a huge basket filled with water to simulate the pressure vessel and PVC pipes as fuel rods. Dry ice was used to simulate steam production. For the human chain reaction activity, everyone in the room (including parents) was given two "neutrons" (wadded up paper) and instructed to throw their "neutrons" when hit by another neutron to further demonstrate a chain reaction.

Fusion

Students were escorted into the former reactor room in the basement of Etcheverry Hall to tour current experiments and to view a plasma experiment. The kids were able to see the reactor bay, where the now decommissioned reactor used to be, as well as other experimental setups including a hydraulics experiment nicknamed "the toilet". They also received a short talk on plasmas and why they are useful and interesting. Graduate students showed the kids a microwave plasma source and an RF plasma source, while explaining how the plasmas were generated in each experiment. Holding up a fluorescent light bulb next to the RF plasma demonstrated that the plasma could excite the atoms inside the light bulb.

Feedback

Here are some letters that enthusiastic parents wrote to Leslie Buchalter after the event. Names were omitted for confidentiality reasons.

Hi Leslie,

I just wanted to say what a FANTASTIC time the kids had today. It was a great day. The grad students were so enthusiastic and engaging. [My child] said "That was the best field trip I've ever been on" -- and it takes a lot to impress him.

Happy Parent #1

Leslie is deserving of a HUGE thank you for organizing the field trip to the Berkeley Nuclear Engineering Department last Saturday. From our group [list of children] attended. Many, many graduate students volunteered their time and energy to organize five workshops/tours for the kids that were informative, hands-on, and fun! The kids (and

adults!) were engaged and interested the whole time. Thank you, Leslie, for the time and effort it must have taken to make this rare opportunity available to our children.

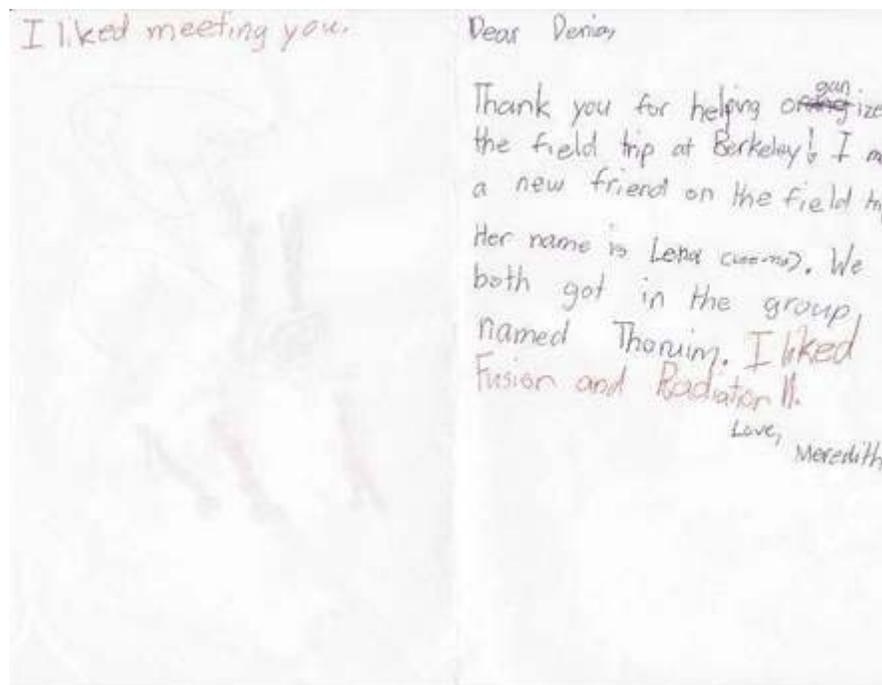
Happy Parent #2

Hi Leslie,

Thanks again for organizing a wonderful field trip on Saturday! [My son] really enjoyed himself and I think learned a lot too – as did the rest of the family! We really appreciated all the hard work you and the graduate students put into making this such a great day! We thoroughly enjoyed meeting them and sharing in their enthusiasm for Nuclear Engineering. It was also a nice touch having the Dept. Chair there for the awards ceremony. Please pass on our sincere thanks to the students and faculty for hosting us!

Happy Parent #3

A letter from a child, received in the mail after the event



Pictures

Lunch at Bear's Lair and Walk Across Campus



Lunch at the Bear's Lair



Walking across campus and up the hill



The five groups

Information Session



Bor-ring! Snore.

Radiation I



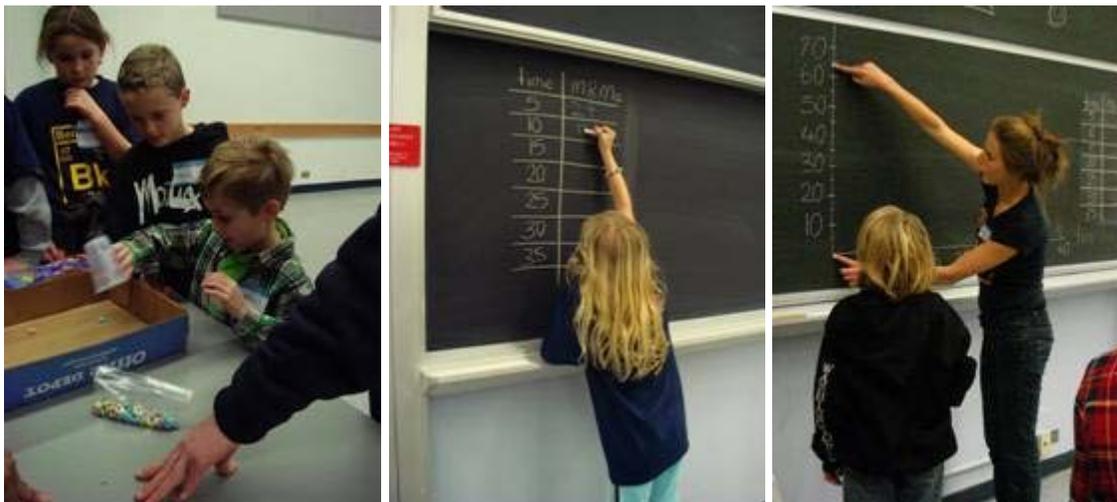
Time, distance, shielding



Cloud chamber demonstration

Radiation II

Radioactive Decay with M&Ms



Throwing out upside down M&Ms at each “half-life”, collecting data, and plotting data

Decay Chain



A Th-232 nucleus with an “alpha particle,” a decay chain emitting gamma rays (silly string), and the aftermath

Fission

Introduction to Fission and Nuclear Power



Mousetrap Chain Reaction



Getting excited about the mousetrap chain reaction and some fascinated yawning children

Dr. Stupid's Reactor



A mock-up of a reactor pressure vessel with simulated steam (dry ice)

Human Chain Reaction



Before and during human chain reaction

Fusion



Touring the reactor room and plasma experiments

Graduation Ceremony



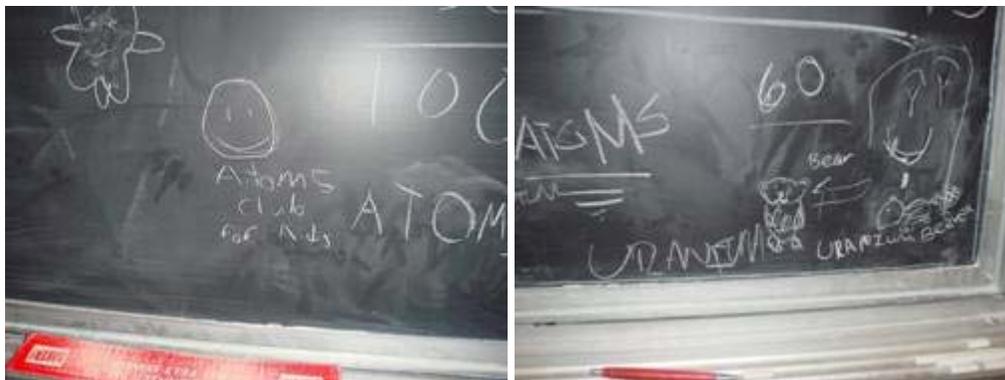
Tugging at pant leg



Professor Vujic handing out “Junior Nuclear Engineer” certificates



The End



The Crew



The "Who's Who" trifold

EVENT SCHEDULE

Group Schedules:
What group has to be in what room at what time?

Time	Hydrogen	Xenon	Uranium	Thorium	Plutonium
12:00 pm	Lunch	Lunch	Lunch	Lunch	Lunch
1:30 pm	Fusion	Radiation I	Radiation II	Fusion	Info Session
2:00 pm	Radiation I	Radiation II	Fusion	Info Session	Fusion
2:30 pm	Radiation II	Fusion	Info Session	Fusion	Radiation I
3:00 pm	Fusion	Info Session	Radiation I	Radiation II	
3:30 pm	Info Session	Philips	Radiation I	Radiation II	Fusion
4:00 pm	Closing Ceremony				

Acknowledgements

The American Nuclear Society Berkeley Student Section would like to express their deepest gratitude to the following people for making this event possible:

Leslie Buchater
Jasmina Vujic
Lisa Zemelman

All our friends and fellow students that became nuclear engineers for a day

All the kids and all parents for their constant efforts and enthusiasm!

**ATOM Science Club
at UC Berkeley
Nuclear Engineering Department**



February 24, 2007



hosted by:
**American Nuclear Society
UC Berkeley Student Section**



American Nuclear Society
University of California at Berkeley
Student Section

WHO'S WHO IN THE NUCLEAR ENGINEERING DEPARTMENT

Dear Kids,

Welcome to our Nuclear Engineering department at UC Berkeley! We are so excited to have you here today! We hope you have fun meeting us and learning about nuclear science. Here we present a little bit about ourselves so that you can get to know us better! If you have any questions in the future, feel free to send us an email!

-the UC Berkeley ANS Student Section

HARIKO MURAKAMI

Hi, I am Hariko. I am studying how we can bury the nuclear waste safely and make sure it does not affect us and our children and grandchildren for a long time.
email: harikom@berkeley.edu



SAHAK MARGOSSIAN

Hey kids! When I was younger I used to skateboard and play guitar in a rock band! Now I want to be a nuclear engineer so that I can find new ways of making electricity with nuclear power and keep the air clean so we can all do goofy skateboarding tricks and play video games whenever we want!
email: slmargossian@berkeley.edu



MAX FRATONI

Hi! When I was a kid I used to play soccer everyday and it was a lot of fun. Now I play with neurons everyday to make better nuclear reactors (this is even more fun!)
email: maxfratoni@berkeley.edu



KIM PHAM

Hi! I'm a nuclear engineering undergraduate who loves to play guitar and pretty much any sport. I love nuclear engineering because I think it's the coolest type of engineering out there!
email: kimpham@berkeley.edu



LANCE KIM

When I was your age, I was a straight-A student, played the violin, and enjoyed swimming and riding bikes with my friends. I am now a graduate student in Nuclear Engineering and Public Policy. I study how the world should best use nuclear energy.
email: lancekim@berkeley.edu



ANDREA KRITCHER

Hey guys! When I was a kid, I used to take every thing apart, from toy cars to watches, just to see how they worked! My love for math and wanting to understand how things work made me want to be an engineer! So now I'm a grad student specializing in plasma physics and Integral Confinement Fusion.
email: akritcher@berkeley.edu



YING WU

"Hello everyone! When I was little I wanted to be an astronaut because I liked to look at stars. Now I'm working with plasmas, which is what stars (like our sun) is made of. I hope you enjoy your visit to our department, and go home!"
email: yingwu@berkeley.edu



DARWIN DAMBA

You may have heard about my book regarding evolution, but don't let that fool you, I'm still a kid at heart! I love playing basketball, tennis, rollerblading, and watching movies. As a nuclear engineer I want to study the applications of nuclear technology on medical treatments of cancer. I am thrilled to share my passion for nuclear science with you today.
email: darwin@damba@gmail.com



CHRISTINA LEGGETT

Hi! I'm Christina. I currently study chemistry with radioactive elements (nuclear chemistry) but when I was a child, I liked to dissect insects, make "poisons", collect cool rocks, and paint! I still like mixing stuff and cool rocks though.
email: cleggett@berkeley.edu



ANH MAI

Hey, I'm Anh and I'm a third year nuclear engineer undergrad. I love to play sports, especially basketball and football.
email: anhmai@berkeley.edu

