



## 2007 Summer Physics Workshop for High School Students

July 5, 6, 9, 10, 2007, plus individually-arranged shadowing days

Department of Physics

Campbell Hall, Room 310, 1300 University Blvd.

Birmingham, AL 35294-1170

To: High school students, parents, teachers, advisors

Date: Summer, 2007

We invite high school students entering their junior or senior years, and who are considering careers in science, technology, computation or mathematics, to apply for our 2006 Summer Physics Workshop. If you are a graduating senior who will enter UAB in the fall of 2006, and plan to major in science or mathematics, we also invite you to apply. If you are teacher or advisor to such students, please pass this information to them and offer to be a reference.

The purpose of the workshop is to give students experience on how Physics impacts our daily lives, in recreational activities (roller coasters!!) and in technology that we use every day and that we *will use* in the future. Students will experience the design and performance of problem-solving research, see the operation of sophisticated instrumentation, and discuss science and careers with scientists of all levels, undergraduate student to full professor.

The theme of the workshop is “*Roller Coasters and Technology*”. The workshop will consist of a first-day session devoted to orientation, presentation about the Physics of roller coasters, use of accelerometers, and lessons on the use of video cameras to capture roller coaster motion, and division of students into small groups. Our second day will be at *Alabama Adventure* where the triple-loop Zoomerang steel coaster will enter its third year of operation. Students will ride both the Zoomerang and wooden Rampage coasters and make video clips of its thrilling motion, to be analyzed at UAB in following days. The first four days, July 5,6,9,10, will close with a roller coaster design competition where the students will create a model coaster based on what they learned at *Alabama Adventure* and at UAB, employing commercial coaster software. Three prizes, with a total value of \$150, will be awarded, with public recognition at the fall Einstein Lecture (tba).

During the following weeks students will experience UAB research lab shadowing experiences—2 days in each lab, as arranged between research group and student.<sup>1</sup> Research areas include astrobiology, biophysics, and computational science; electronic, ultrahard and nano-materials; lasers and imaging.<sup>2</sup> These shadowing experiences are a good opportunity for students to explore college life and possibilities for further mentoring in science fair and research projects during the school year.

The final event of the workshop will be a Sunday afternoon (tentative) fall **Einstein Lecture**, to which parents/guardians, friends and the general public will be invited. Workshop attendees will be recognized and the roller coaster awards announced. The 2006 Einstein Lecture, with an audience of more than 200, was by Paul Kwiat on Quantum Computing. Workshop attendees will receive invitation letters, but also check the UAB Physics website, [www.phy.uab.edu](http://www.phy.uab.edu), check News & Events and Outreach.

Workshops will begin each day at 10:00 AM and finish at about 3:00 PM. A non-refundable application fee of \$15 will also cover costs of workshop career and other informational materials (inc. CD) for each applicant. Upon acceptance into the program, an additional fee of \$60 will cover all other workshop costs.<sup>3</sup> Students must arrange for transportation to and from Campbell Hall and to Alabama Adventure on July 6. Lunch will be provided on July 5 and 10.

We invite you to use the attached forms to apply to the program. The target date for receipt of applications is April 30, 2007. (Call if later.) We have a limit of 25 students, so the experience will allow considerable personal attention.

Sincerely yours,

Thomas M. Nordlund, Physics Undergraduate Program Director

---

<sup>1</sup> Schedule to be posted on [www.phy.uab.edu](http://www.phy.uab.edu), Outreach, High School programs.

<sup>2</sup> Students will not be able to participate in all of these areas.

<sup>3</sup> Need-based fee waivers can be requested.

## Focuses of Workshop:

- Roller Coaster Physics, including a design competition
- Doing modern research
- Careers
- The legacy of Einstein

## Schedule of Events:

Monday	Tuesday	Wednesday	Thursday	Friday	
July 2	July 3	July 4 4th of July	July 5	July 6	
			<ul style="list-style-type: none"> <li>• Registration, orientation</li> <li>• Shadowing days sign-up</li> <li>• Physics of Roller Coasters</li> <li>• Digital Video techniques</li> <li>• Accelerometers</li> <li>• Roller Coaster design software</li> </ul>	<b>Day at Alabama Adventure:</b> <ul style="list-style-type: none"> <li>• Ride "Rampage" &amp; "Zoomerang"</li> <li>• Use accelerometer, digital video</li> <li>• Free time</li> </ul>	
July 9	July 10	July 11	July 12	July 13	
<ul style="list-style-type: none"> <li>• Analyze Alabama Adventure results</li> <li>• Begin Roller Coaster design competition</li> </ul>	<ul style="list-style-type: none"> <li>• Complete Roller Coaster design competition</li> <li>• Judging</li> <li>• Prep. for research shadowing</li> </ul>				
Laboratory shadowing: 4 days; Schedule in July, August.					
		Nanotechnology	Lasers	Diamond	Computers
		Electronic materials	Biophysics	Astro-science	
<b>Einstein Physics Lecture: Scheduled in Fall Semester (tba)</b>					

**Approx time:** 10 AM - 3:00 PM each day (Earlier start on Alabama Adventure day.)

**Dates:** July 5, 6, 9, 10, 2007, plus four individually-scheduled research shadowing days

**Age:** Students should be 16 or older. (Inquire if borderline.)

Approximately 25 students can be accommodated. Selection is based on application date, interest, potential as a future physical scientist. Preference is given to (i) students who are sophomores or juniors in high school, and (ii) seniors who have applied to UAB and indicate plans to major in Physics.

**Cost:** \$75 registration fee (inc. \$15 nonrefundable application fee). Covers needed materials (inc. DVD to be distributed at end of summer), day at Alabama Adventure, two lunches, T-shirt, and UAB undergrad student helpers. Scholarships available, based on need, recommendation(s) of science teacher and/or school counselor, and potential as a future physical scientist.

**Transportation:** Students and parents/guardians are responsible for all transportation, including to Alabama Adventure theme park. Parking at UAB will be available for a nominal fee.

**Target date for Applications:** April 30, 2007. (Early applicants will be accepted early.)

**Absolute Last Day to sign up:** July 5, 2006 (Call first, then come to address below.)

**Location:**

Department of Physics  
University of Alabama at Birmingham  
Campbell Hall, Room 310  
1300 University Blvd. (US mail 1530 3rd Ave. S)  
Birmingham, AL 35294-1170

Contact:

Thomas Nordlund  
Physics Undergraduate Program Director

[nordlund@uab.edu](mailto:nordlund@uab.edu)

Tel: 205-934-0340 or 934-4736

Fax: 205-934-8042