

Program for AAPT Topical Conference:  
Teaching General Relativity to Undergraduates  
Syracuse University, Syracuse, NY – July 20-21, 2006



**Purpose**

The purpose of the conference is to share ways to teach general relativity to undergraduate physics students and to insert general relativity into the undergraduate curriculum. Participants are university and college faculty interested in doing this at their home institutions. Some participants already teach or have taught general relativity to undergraduates and some are looking for ways to introduce concepts of general relativity into their existing physics curriculum.

To maintain focus, the workshop emphasizes gravitational radiation and LIGO, deviations from Newtonian gravitation and GPS, and black holes. Visiting experts will give talks on these subjects with particular emphasis on how they may be used to present important ideas of general relativity to undergraduates.

Participants will explore how to teach undergraduate physics students basic concepts and important phenomena of general relativity. They will review and share existing approaches, but they will also develop new ideas for teaching general relativity. They will propose strategies for introducing ideas of general relativity into existing courses. Outcomes will be published on-line.

Participants are invited to prepare a poster describing how they teach general relativity and what projects they have assigned to students at different levels. Posters will remain up throughout the conference.

**Speakers and Organization**

**THURSDAY, JULY 20, 2006**

7:30 – 8:00 Set up posters

8:00 – 8:15 Welcoming remarks

8:15 – 9:00 **Jorge Pullin**, LSU and LIGO, reviews the central ideas of the theory for the participants new to the teaching of general relativity

9:00 – 9:30 Question and discussion session with Pullin, chaired by Vokos

9:30 – 10:00 coffee break, poster discussions

Different approaches to teaching general relativity to undergraduates:

10:00 – 10:30 **Jim Hartle**, UCSB: Teaching the physics of general relativity first

10:30 – 10:45 Discussion

10:45 – 11:15 **Tom Moore**, Pomona College: Teaching general relativity and its math

11:15 – 11:30 Discussion

11:30 – 12:45 Three breakout sessions on existing syllabi: What decisions do you need to make as you create a syllabus for each of the following cases:

1. Insertion strategies and GR for students with little physics
2. Math intense
3. Physics First

12:45 – 4:00

Further discussion of posters

Lunch and explore Syracuse:

Tour the Syracuse physics department

Visit the Everson Museum of Art

Visit MOST: Museum of Science and Technology

Syracuse Zoo

Salt City Museum

Hiking in Onondaga Lake County Park

Boating on Jamesville Reservoir from Jamesville Park

4:00 – 4:30 **Neil Ashby**, U. Colorado: Teaching the general relativity of GPS

## Program for Teaching General Relativity to Undergraduates

4:30 – 4:45 Discussion

5:00 – 5:30 **Peter Saulson**, Syracuse U.: Teaching gravitational radiation

5:30 – 5:45 Discussion

6:00 – 6:45 Supper

7:00 – 7:30 **Don Marolf**, UCSB: Teaching black holes

7:30 – 7:45 Discussion

8:00 – 9:30 Breakout sessions: Identify problems that use GPS, gravitational radiation, and black holes to support

1. insertion strategies
2. math intensive approach
3. physics first approach

and outline model syllabi incorporating these.

## FRIDAY, JULY 21, 2006

9:00 – 9:45 **Rai Weiss**, MIT and LIGO: Experiments and observations that motivate students to understand the essential physics of general relativity

9:45 – 10:15 Discussion session with Weiss, chaired by Saulson

10:15 – 10:45 Coffee break, poster discussions

10:45 – 11:15 **Stamatis Vokos**, Seattle Pacific U.: Student Understanding and Misunderstanding of Conceptions Important in General Relativity

11:15 – 11:30 Discussion

11:30 – 12:30 Poster Summaries: General relativity projects for students at different levels (~3 minutes each). Moderated by Michelle Larson, Dale Ingram, John Thacker

12:30 – 1:30 lunch and poster discussions

1:30 – 2:45 Breakout sessions refine syllabi and problem lists; suggest FAQs for website list; try out the AAPT GR list serve

1. for novices
2. for students in math intensive GR course
3. for students in physics first approach

2:45 – 3:00 Break

3:00 – 3:45 Each group presents its work to the entire workshop

3:45 – 4:00 Designation of the people who will  
moderate the list serve.  
edit materials for ComPADRE.  
answer the FAQs.  
be available to advise conferees when they try out these ideas.  
et al.

4:00 Adjourn