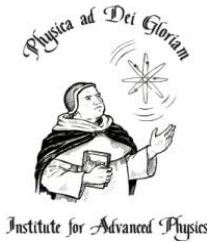


Spring 2009



# THE INSTITUTE FOR ADVANCED PHYSICS

# The Institute News

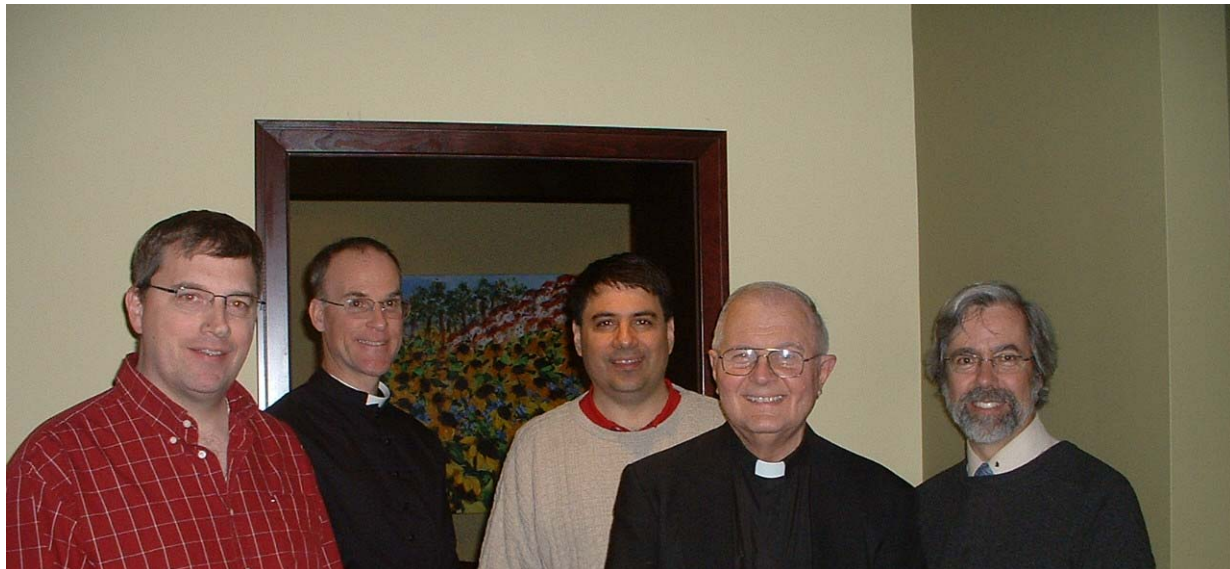
by J. Clifton Hill, PhD, C.S.Sp.

- PFR Teachers Conference at St. Joseph's University
- IAP at National Science Teachers Association Conference
- IAP at Home Schoolers Conference

## Teachers Conference at St. Joseph's University

A leaden sky and the cold of a Philadelphia winter Saturday did not chill the energy of the presentations or the interest of the participants in the IAP's conference on the *Physics for Realists* (PFR) textbook at St. Joseph's University on Saturday, February 28.

The gathering was hosted by the physics department of SJU. SJU faculty and professors from other universities in the region were participants as well as a participant from Denver, CO. **Dr. Rizzi**, IAP Director, presented the sessions and **Drs. Daw** and **Haller** and **Fr. Hill**, IAP physics faculty, facilitated the breakout workshop sessions. **Fr. Neal Nichols** drove from Virginia to join the faculty and offer the sacraments to all. IAP would also like to thank SJU and **Dr. Ken Klenk** for sponsoring the event.



IAP Staff at SJU Conference. From left to right, Dr. Joe Haller, Fr. Neal Nichols, Dr. Anthony Rizzi, Fr. Clifton Hill, PhD, Dr. Murray Daw.

In the lecture/discussion sessions Dr. Rizzi led the group in a chapter-by-chapter tour of the textbook. Time was allowed for questions and discussion and there was a good measure of response from the participants. The first three chapters are each in their own way critical. In the first chapter, the fundamental physical foundations of the course are laid. A participant asked at what point do we adopt Feynman's adage<sup>1</sup> and 'Shut up and calculate'? PFR does train the student in calculation techniques, but not at the expense of physical understanding. Indeed, in Feynman's imaginative approach to physics, he was trying to 'get back to the basics.' PFR actually accomplishes this goal by its realistic approach to fundamentals.

The second chapter gives a review of the requisite mathematics, but starts with its empirical grounding. There were questions and discussion about the concept of "limit" in calculus. One point: We 'complete the limit'; nature does not. The fact that physicists are generally surprised by the way that mathematics describes real situations shows that they do not appreciate the fact that mathematics is the study of quantity, the first property of material things.

The third chapter introduces impetus, the central and unifying theme of this volume of PFR. Most introductory physics texts introduce momentum later in the course. In PFR it is treated in the first of the Newtonian physics chapters. Other texts typically have no real *explanation* of momentum or of mass. Their approach ends up as more apprenticeship than education: The student learns how we *do* physics; no explanation; no grounding. It amounts to giving up on reaching the reality of the world. One faculty commented that a good way to test a student's understanding of momentum is to ask him to explain it,

without using mathematics. PFR will equip the student to do this.

After the presentation on energy and work, the participants broke out into smaller sections mentored by Dr. Daw, Dr. Haller and Fr. Hill, and Dr. Rizzi. Acting first as students and then as teachers, the participants got some guided practice in presenting the material of the early chapters. This kind of practice is valuable in helping to understand the unique foundational approach of *Physics for Realists*.



For information on purchasing *Physics for Realists* and its *Solutions Manual*, go to: <http://iapweb.org/store/>

The text's chapters on angular momentum and gravity were next presented to a full session of the participants. Then they returned to the smaller groups with their mentors to work together on some selected homework problems which appear in the text.

*Article continues on next page*

<sup>1</sup>It appears this adage was actually due to David Mermin (cf. *Physics Today* May 2004)

The final full session presented the chapter on the Manned Trip to Mars, which applies all of the principles learned in previous chapters to the unifying practical theme that runs throughout the book. A session on the text's final chapter, special relativity, which, in a *tour de force*, brings out the real ontological content in the amazing predictions of the theory, was followed by time for discussion. This last chapter is, by itself, of historic significance.

Some questions and comments surfaced in later discussions: How does one break up the angular momentum of a lepton or hadrons into the linear components of impetus? *Ans:* This subject belongs to the more advanced topics in

physics (i.e., beyond Newtonian mechanics) that are yet to be explored ontologically, but we can say these seem to be called angular momentum by analogy, not univocally. Many of the topics in PFR are unique and have no equivalent in other texts. Though the text is calculus based, once teachers digest the material, the text can be used with great effect in "physics for poets" courses. This is because the foundational approach of the text manifests the common sense starting point of each Newtonian physics concept.

PFR is a revolutionary book with a profound physical grounding that changes the way Newtonian physics is taught and understood. What else could explain the enthusiastic comment of the chairman of the SJU physics department that SJU is going to use this book!

## National Science Teachers Conference

**Dr. Anthony Rizzi**, IAP Director, and associate member **David Giroir** attended the National Science Teachers Association conference in New Orleans on March 21, 2009. They were guests of **Mr. Alan Wegienka** and **Dr. Paul Mitiguy** of **Design Simulation Technologies** and joined them at their booth in the exhibit hall at the Ernest N. Morial Convention Center. Design Simulation has donated copies of *Interactive Physics* software to be included with each copy of the *Physics for Realists* textbook. This involves a contribution valued at \$50,000. IAP is grateful for their partnership in the PFR textbook and their support for IAP's mission.

IAP presence at the conference, largest gathering of science teachers in the nation, afforded the opportunity to talk to the conference attendees about the textbook and to sell copies as well.



Left to right, Dr. Paul Mitiguy, Dr. Anthony Rizzi, Mr. Alan Wegienka, Mr. David Giroir

Mr. Wegienka, president of Design Simulation Technologies, and Dr. Mitiguy were excited to learn more about the grounding of the sciences which the text brings out. Dr. Mitiguy, consulting professor in the Mechanical Engineering Design Group at Stanford University, said the approach profoundly changed the way he thinks.

## RCHAL Home School Conference

The Institute for Advanced Physics was well represented at the annual curriculum fair at the 2009 Conference of the Catholic Home School Association of Louisiana, held in Covington, Louisiana on Saturday, April 4. **Fr. Clifton Hill, Mr. Don Caffery and Mr. David Giroir** took the opportunity to inform home school parents about IAP's important mission and make available IAP materials for perusal or purchase.



**Dr. Anthony Rizzi** gave a talk to the entire group, which generated a great deal of interest in the work of the IAP. At the IAP table there was an ongoing video presentation explaining the importance of the content and approach of *Physics for Realists*. Manned by Caffery, Giroir, Hill and other IAP staff, personal help and IAP publications (such as *Physics for Realists*, *The Science before Science*, and IAP dvd's) were made available to the conference participants.

way we think) can only be overcome by a recovering fundamental truths, the IAP materials uncover and rigorously apply these fundamental truths. At the most basic level, these truths were first articulated by Aristotle and further deepened and developed by St. Thomas Aquinas.

Recognizing that the profound problems in our culture (which reveal deep errors in the

In conversation attendees brought out the need for better science materials than are now available for home schoolers. With their common-sense reestablishment of the fundamentals, IAP materials will help remedy this lack.

*The Institute for Advanced Physics presents*

### ***Physics for Realists VI*** ***Electricity and Magnetism***

Invitation only

**Wednesday, July 22 to Saturday, July 25, 2009**  
**The University of Notre Dame, South Bend, IN**

