



THE INSTITUTE FOR ADVANCED PHYSICS

The Institute News

- 13th annual members' conference at Louisiana State University
- Closing in on one of the Seven Wonders of the World
- Workshops for high school and middle school teachers
- *Physics for Realists: What is the E-field?*
- *Is there in Truth, Beauty?* by Dr. Rizzi

Thirteenth Annual IAP Conference

Quantum Mechanics

by Ken Klenk, Ph.D., IAP Certified Member
photos courtesy of Ken Klenk

A very successful *Thirteenth Annual Institute for Advanced Physics (IAP) Conference* was held at the **Louisiana State University** (LSU) in Baton Rouge on July 29 to August 1, 2015. Work and discussion at the meeting focused on even further untangling the fully physical meaning from the deeply empiriometric structure of modern quantum mechanics. As with mechanics and electricity & magnetism, the deep understanding of quantum mechanics that we are uncovering will culminate in the production of our third college textbook - *Physics for Realists: Quantum Mechanics*.

Two pre-conference meetings were held. On Tuesday evening, July 28, **Anthony DiCarlo** headed up a meeting with **Maikel Garcia** and **Frank Camacho** on the development of the first six chapters of an Algebra Guide to accompany the textbook *Physics for Realists: Mechanics* (PFR). Also, on this night, Dr. Rizzi gave the group detailed and principle guidelines for the Guide. The Guide, which takes the reader through the PFR textbook at a basic algebra level, will provide an excellent resource for students who do not have knowledge of calculus. It also adds material typically found in high school level physics courses to make it usable by 9th grade and up. *Story continues on page 2*

IAP faculty and members (*standing, left to right*) Fr. Neal Nichols, Dr. Jim Stoner, Dr. Joe Haller, Dr. Stephen Strickland, Dr. Dan Lejeune, Dr. Anthony Rizzi, Anthony DiCarlo, Dr. Ted Dickel, Maikel Garcia, (*kneeling, left to right*) James Louviere, David Giroir, Dr. Murray Daw, Dr. Dan Welch, Dr. Ken Klenk, Frank Camacho, Dr. Joe Martin, and Dr. J. Kevin Hix



Annual conference story continued from page 1...



The second pre-conference meeting was led by IAP Faculty **Dr. Murray Daw** on Wednesday, July 29, to review some of the foundational understanding behind *A Kid's Introduction to Physics (and Beyond)* and the *Physics for Realists* mechanics and E&M textbooks. Dr. Daw contributed lessons learned from his many years of teaching PFR at Clemson University. This was followed by a pizza dinner and another stimulating conversation related to the nature of man.



At this year's conference, **Dr. Kevin Hix, M.D.** was awarded his certificate for becoming an Associate Member in June 2014. Dr. Hix is board certified in internal medicine and nephrology and currently serves as the medical director for patient dialysis services at Rochester General Hospital. Read more about him in our 2014 spring newsletter on page 3 at http://www.iapweb.org/newsletter_sp14.pdf.



The conference was primarily concerned with the major themes that will comprise our textbook on quantum mechanics (QM). **Dr. Anthony Rizzi** led off the conference with a discussion of the consequences of the empiriological based culture in which we are all immersed and which substitutes empiriological methods and ends or for the truth. To reject or to ignore the truth is the primal sin. He said that there are three

levels of empiriometric development – firstly, the stage of raw findings that come from new research, secondly, the partially developed explanations that usually find their way into textbooks and thirdly the fully developed understanding which is what the Institute is doing for the first time in history. He went on to focus on quantum mechanics saying that a major point of the textbook will be clearly revealing that quantum mechanics is statistical and cannot reach the individual, but only the ensemble, but still can reach deep aspects of reality.



Dr. Murray Daw discussed the De Broglie-Bohm approach to QM and showed that one gets the same ensemble predictions as the standard approach. He discussed in some detail the quantum potential for free particles and passing Gaussians.

Thursday afternoon saw the attendees break into two groups. One group worked on information for the inside covers and appendices. The other group considered for the textbook some QM problems relating to the students experiences.



Dr. Rizzi presented a complete table of contents for the textbook. The textbook will begin with a discussion of the key experiments in quantum mechanics, a fully physical-centered development of the Schrödinger equation and the need for statistical approach. As usual, he brings out how the empiriological method is not an end itself, *Story continues on page 3*



left: Frank Camacho, Maikel Garcia, and Anthony DiCarlo (seated) work on the algebra guide; center: Kevin Hix receives membership certificate from Rizzi; right: Murray Daw and Joe Haller

Annual conference story continued from page 2...

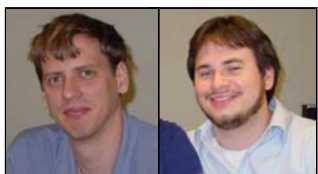
but a tool to reach the fully physical understanding. The outline is comprehensive and addresses the major areas that challenge a student's common sense and provides explanations. He also discussed the possible understandings associated with Bell's theorem and EPR (Einstein, Podolsky, and Rosen) Paradox as well as very recent discoveries in quantum mechanics and IAP's collaboration with top people in the field.



Dr. Joe Martin discussed how the theme of the Manned Mission to Mars will continue in the QM textbook. He discussed the various real-life efforts to send a man-mission to Mars such as those developed by the Mars Society, Space-X, Mars One and the NASA effort. He called attention to the severe problem of radiation exposure both from the sun and from cosmic radiation which only NASA Langley seems to be seriously investigating.



Dr. Joe Haller discussed the status of the computer simulations that he has been doing to understand how the Zero Point Energy (ZPE) can cause quantum behavior.



Dr. Ted Dickel and **Dr. Stephen Strickland** presented an insightful look at the hydrodynamic research being done on bouncing drops that reveal striking analogies to quantum phenomena. They will be looking for ways to integrate a discussion of this research into the textbook.



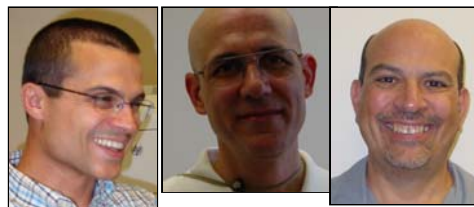
Dr. Ken Klenk spoke on the history of quantum mechanics, including the life of Nobel Laureate Arthur Compton, whose "Compton effect" (x-ray scattering from an electron) helped establish the validity of quantum mechanics. He also looked at an extended list of quantum physicists and showed

their birth dates and country of birth to see long term trends in their orientations.



Dr. Dan Welch and **Dr. Dan Lejeune** led the evening sessions which were devoted to implementing and explaining several experiments that are important in quantum mechanics: determination of Planck's constant, an analogical quantum eraser and photoelectric experiments.

Anthony DiCarlo, Maikel Garica and **Frank Camacho** gave an update on the status of development of the Algebra Guide.



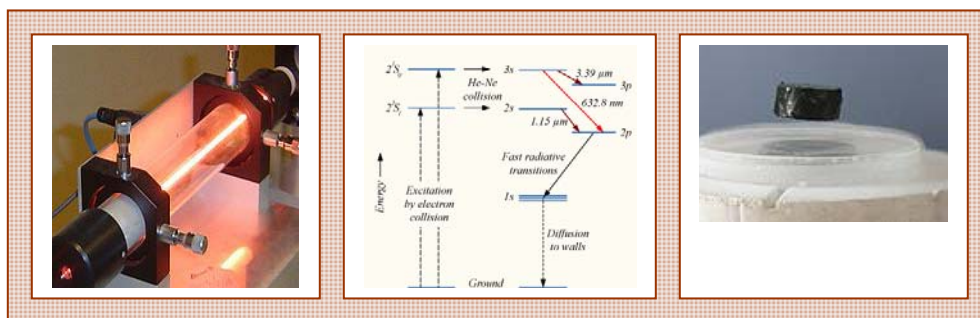
Father Neal Nichols, the IAP chaplain said daily mass, led prayers and blessed our conference sessions and heard confessions for the attendees. **James Louviere** recorded video of segments of the conference and **David Giroir** provided logistics support. **James Stoner**, a long-time member of the IAP, and **Don Caffery** participated in the conference's discussion on Friday. A special surprise birthday cake was presented to Dr. Daw by the IAP community to celebrate his 60th birthday.



Closing in on one of the Seven Wonders of the World

Our Quantum Mechanics research continues with great success. Several papers are in the final stages. The work includes answers to deep questions posed by the great discoveries of the 20th century. The Aharonov–Bohm effect has been called one of the Seven Wonders of the World and IAP has completed significant work in this area (see paper at <http://arxiv.org/abs/1507.00068>). Quantum Field Theory research has also been advancing.

All this work is moving us closer to the writing and production of our 3rd textbook, *Physics for Realists: Quantum Mechanics*. Of course, much more research and writing must be done in both Quantum Mechanics and Quantum Field Theory. There is much to learn, much captured in the wonderful, but somewhat opaque equations of these two central areas of physics.



Workshops for High School & Middle School Teachers

Institute for Advanced Physics members teach seminars for public, private and home school teachers on the *A Kid's Introduction to Physics (and Beyond)*. **Dr. Daw** and Mr. DiCarlo gave a seminar to home school families in the Upstate of South Carolina. Another seminar, led by **Anthony DiCarlo**, was for home school teachers in Mississippi. Participants completed homework assignments and participated in phone conferences to help deepen their understanding of the material. The participants were excited to learn the fundamental truths presented in the Kid's book and committed to passing their new understanding on to their children.

Dear fellow rational, sentient, living, material substances,[this comes from the Science Before Science]

*I was trying to explain that I am overwhelmed with the understanding that I am made to know...that we are created with the capacity to know. There are so many things which I used to think were "out of my league" to understand--that I was just too ignorant, or didn't have the capacity to understand and remember. Now I know that I felt that way because I was missing the basic physics that this simple book [**A Kid's Introduction to Physics (and Beyond)**] is providing for me!*

Yes, when I started home schooling, I felt I had to learn new things to teach my children because there was so much in which I was lacking. But this new "a-ha!" moment of understanding for me is more personal. Sure, He used my children to get me here, but it is now more specifically about me. HE wants ME to know. WOW! GOD made ME to know. WOW! This is, first, about my relationship with, and knowledge of, the Unchangeable-Changer! WOW! WOW! WOW!

Thank you [IAP]! ... I am so grateful!

*In Christ, **Alysia L.**, Mississippi*

*Participant in one (Sept/Oct 2015) of IAP's **Teacher's Workshop***

PFR-EM Teachers Conference at Wofford College

by Frank Camacho, IAP Associate Member
photo courtesy of Frank Camacho



On October 10, 2015, the Institute for Advanced Physics (IAP) offered a conference for college physics professors at Wofford College in Spartanburg, SC. IAP provided an overview of its groundbreaking textbook *Physics for Realists: Electricity and Magnetism (PFR-EM)* written by **Dr. Anthony Rizzi**, Director of IAP. IAP taught the professors the new material as well as how to teach it. Participants came from **Wofford College, Clemson University, North Carolina State University, Anderson University, Lander University, Tri-County Technical College**, and as far away as New Mexico.

Dr. Murray Daw, IAP faculty, summarized the main concepts described in the first volume of the *PFR* series, *Physics for Realists: Mechanics (PFR-M)*, in order to establish the foundations of impetus, force, and energy upon which *PFR-EM* builds. Dr. Rizzi presented the first seven chapters. He introduced the professors to the *fundamentally new understanding* of electricity and magnetism which allowed him to develop, for the first time, a common sense pedagogy that takes students from their immediate sense experience to the heights of modern physics.

After covering the concepts of the static electric field and potential, the static magnetic field and vector potential, magnetic induction, and quasi-static effects, Dr. Rizzi explained the development of the full Maxwell's equations and how they imply the propagation of the electric and magnetic fields (radiation). His presentation culminated by showing how the theory of special relativity reveals the deep interrelation between electric and magnetic fields. A key aspect of the entire development of the material presented in *PFR-EM* is how the scalar potential ϕ (which specifies the

electric field) and the vector potential A (which specifies the magnetic field) are treated as fundamental entities that simplify the exposition and yield new physical insights.

Dr. Rizzi also discussed how the unity of principle that underpins *PFR-EM* (which allows equations and even the history to be understood from a common sense grounding) leads into and is completed by practical work in the text. This is done in particular in Chapter 10 where students are challenged to understand, design, and build a radio transmitter that relates back to the overarching practical theme of the manned mission to Mars initiated in *PFR-M*. Throughout his presentation, Dr. Rizzi showed how *PFR-EM* solidly grounds the mathematics required for the text in common sense experience by emphasizing how mathematics is rooted in the physical nature of the world because it is the study of quantity, which is first property of all physical things. There was also time for teacher-student role playing and informal discussions.



Teacher role play
participant Dr. Stephen Strickland demonstrates a concept during a small group break out session.

Physics for Realists: What is the E-field?



Dr. Murray S. Daw, R. A. Bowen Professor of Physics Department of Physics & Astronomy Clemson University, attracted another full house crowd at a Clemson University colloquium on August 27, 2015. As many of you know, Dr. Daw is an IAP faculty member since 2006, and a member since 2005, involved in teaching and research. He teaches *Physics for Realists* to college students and at physics colloquiums. The topic this fall was *Physics for Realists: What is the E-field? (Is it true that changing E causes curling B and vice versa?)*.

Daw explained to attendees that recent work by Anthony Rizzi brings to light widely unrecognized, fundamental principles and leads to fresh insights into modern physics. Based on these fully physical principles, Rizzi has written a freshman physics textbook, *Physics for Realists*. In this presentation, he showed how Rizzi's principled approach gives substantive physical insights into a subject that is conventionally obscured by formal mathematical considerations. His presentation generated some interesting questions and answers. Here's a small sample:

Q: Is there really any consequence to saying that the plana exists? It seems like it is of no consequence.

A: Our job as physicists is to look for what is really there — that's the first answer. Second, of course the plana has a consequence, which is how we know that it is there — we know it by its effects, which is what I said in the talk.

Q: What was wrong with Maxwell's Theory of the Aether?

A: He postulated the existence of a mechanical medium, the vibrations of which were light waves. Clearly it has been disproved that light is not a vibration of a mechanical medium, but it remains nonetheless that light does propagate through something, and that some non-massive substance must exist between massive bodies. As Dr. Rizzi, points out, "we do have a word for 'plana' already: it's 'vacuum.' However, because of our empiriological mindset, we don't think about it correctly. 'Vacuum' tends to mean 'nothing,' well nothing is no-thing so is not there! Indeed, that is why we are surprised when we use a word for the vacuum that doesn't mean nothing. So, we need to use a word that will help us see and remember that we are not talking about nothing. Plana, the feminine of the Latin word for field, reminds us that the plana's chief characteristic is its receptivity to fields. Maxwell realized that one doesn't study 'nothing' but he, in positing the Aether, over-specified using Newtonian categories as if they were generic; this is because he did not have a clear principled understanding of the physical categories." See Dr. Rizzi's *Brief History of Nothing*. iapweb.org/iapmagazine.htm



**EWTN Live with special guest
Prof. Anthony Rizzi
Physics for First Communion
Wednesday, March 9th 8pm ET
2016**

View EWTN online:
<http://www.ewtn.com>,
Select the "Television" tab at the top
and select "Live TV"

empiriological adjective (em-pir-io-logical)

Definitions from Webster and IAP

We found that Webster has picked up this word! But got it wrong.

Merriam-Webster: emphasizing or based on procedures that are both logical and empirical (such as those employing mathematics and experiments)

The Science Before Science by Dr. Rizzi: that tool of the study of the physical world that makes heavy use of beings of reason to bring sensorial data under certain organizational principles, especially in such a way as to maximally predict outcomes. It is identical with the modern scientific method in that it is what distinguishes modern science from ancient science. It is a powerful and essential method for advancing our knowledge; its importance cannot be easily overstated. However, it both reflects and hides in varying degrees the underlying physical reality which is the ultimate cause of the relations it discovers. The empiriological methodology contrasts with full physical methodology, for the latter has the aim of understanding the essence of things; what things are in terms of the four causes. The result of empiriological science is usually a puzzle waiting to be understood in a fully physical way. The empiriological understanding should be a stepping stone to the fully physical understanding. Its most powerful usage is found in physics and mathematics in the *empiriometric* method.

Is there in Truth, Beauty?

by Anthony Rizzi

As you know, IAP is tackling the core of our deep cultural problems, which is our science not being clearly grounded in the principles that every child knows. IAP is repairing the core of our culture by grounding its core thinking, modern science, in our knowledge of the physical things that we know directly through our senses. To give people insight into this deep need (which is currently only addressed by IAP), Dr. Rizzi here addresses the topic of beauty. All of us use the word, all of us are overwhelmed by it at one time or another, but it has fallen on hard times because of the need for a fully formed physics.

It is no secret that our culture has ceased to be beautiful. It is a secret that many of us have lost any sense that beauty is *real*. It's a kind of secret we keep from one another by sometimes acting as if beauty is real and never clearly saying we think it isn't. This lack of clarity, in turn, arises because we never discuss it from its first principle source. This article came out of a conversation with a friend who thought physical beauty was just an emotional reaction in the beholder. In other words, he thought beauty was in the eye of the beholder. No it's even much less than that; he thought it was in solely the feelings of the beholder. In speaking of feminine beauty, he further thought that the differences in height, weight, strength, skin texture, etc., between men and women were statistical, and did not have any basis in the nature of men and women. He said we mistakenly think they do have such a basis because of the statistics. My friend's comments bring to light what we all confusedly think at some habitual level. Let's address this very deep problem in our thinking.

After all, if there is no physical beauty, immense consequences follow. In fact, if there is no *physical* beauty, we can know no other kind of beauty. Why? Because every thing we know comes through what we know through the senses and thus whatever we say about immaterial things,

including their existence, must be said by analogy to the physical things we know first.^{1 2}

Furthermore, if we lose beauty, reality itself is lost because beauty is one of the "transcendentals," i.e., it is reality itself looked at from a certain angle. Reality or "being" is a symphony of beauty.³ Beauty is the goodness of truth.⁴ Beauty is in things, not simply a random feature of the individual beholder. Indeed, we will see the latter is unintelligible.

Beauty is divided into two categories. Because we are physical creatures, and thus limited, some things are beautiful to us (1) immediately and (2) others only in an indirect way. Those that are immediately beautiful to us are those

Copyright August 2014 by Anthony Rizzi, all rights reserved.

[Click here to read more](http://www.iapweb.org/iapmagazine.htm) or go to this link:
<http://www.iapweb.org/iapmagazine.htm>

To support IAP's research that leads to the understanding and writing of these articles, ***we ask for a donation of \$2 per article that you read or download.*** There are more articles at iapweb.org/iapmagazine.htm

Anthony Rizzi, Ph.D., founder and Director of The Institute for Advanced Physics (an eleven year old non-profit organization with Vatican backing), gained worldwide recognition in theoretical physics by solving an 80-year old problem in Einstein's theory. He has physics degrees from MIT and Princeton University. Prior to IAP, he was senior scientist at Cal-Tech's Louisiana LIGO and taught at LSU.

¹ See my *The Science Before Science: A Guide to Thinking in the 21st Century* (SBS).

² See my *Kid's Introduction to Physics (and Beyond)*.

³ More precisely, unity, goodness and truth are the primary transcendentals. Beauty is a derivative category of these. Like the primary ones, beauty is said of various things in many analogous ways.

⁴ At the highest level, goodness is beauty and is only distinct logically, i.e. only distinct in our minds not in reality.