THE INSTITUTE FOR ADVANCED PHYSICS

The Institute News

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Fourteenth Annual IAP Conference

Quantum Mechanics

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

The Fourteenth Annual Institute for Advanced Physics (IAP) Conference was held at the **Louisiana State University** (LSU) in Baton Rouge on July 27 to July 30, 2016. The meeting focused on completing the third in IAP's series of college textbooks, *Physics for Realist: Quantum Mechanics*. Reaching a profound understanding of quantum mechanics in terms of its full physical meaning is the object of the participants' efforts. The textbook is anticipated to be published in the coming year. [Note: recent flooding at the IAP office will delay this target date.]

In pre-conference meetings, on Tuesday evening, July 26, **Anthony DiCarlo**, **Maikel Garcia** and **Randy Nichols** met with Dr. Rizzi to discuss and advance the status of the *Algebra* ***Story continues on page 2***

IAP faculty and members *(left to right)* **Dr. Ken Klenk, Randy Nichols, David Giroir, Dr. Joe Martin, Fr. Neal Nichols, Dr. Murray Daw, Maikel Garcia, Frank Camacho, Dr. Ted Dickel, Dr. Anthony Rizzi, Dr. Dennis Dubro** (candidate for membership)**, Anthony DiCarlo, Dr. Jim Stoner** and **Dr. Dan Welch**

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Algebra Guide developers DiCarlo, Garcia, Camacho

Guide. It is being developed for students without calculus so they can better understand the textbook *Physics for Realists: Mechanics*. (**Frank Camacho** is also working on the guide.) The team is nearing the completion of the first draft of the Guide and is now working on the final chapters. Dr. Daw, Dr. Dubro and Dr. Dickel reviewed and discussed "Our Fall into the Brave New World."

On Wednesday, July 27, **Dr. Murray Daw** conducted a session entitled, "Primer on *Physics for Realist: Mechanics and E&M*". The conference attendees reviewed some of the foundational understanding behind *A Kid's Introduction to Physics (and Beyond)* and several of the fundamental understandings in the *Physics for Realists* textbooks. The evening session was conducted by **Dr. Anthony Rizzi** who led a round-table discussion about the essence of man particularly as manifested in the natures of man and woman.

Dr. Rizzi began the conference on Thursday morning by giving a broad overview of the work of IAP. He, in a later session the next day, emphasized that the culture we live in is over-spiritualized and not materialistic as most believe. We are over-spiritualized because the physical does not matter much to us but only the ideas and intentions we have. We increasingly ignore the physical world through which we know everything. He illustrated the resulting degradation by showing how the music in the culture has moved from the beauty in such 60's songs as "I'll Never Find Another You" by the Seekers to some acid rock of today that purports to be Christian music. Also, television programs in the 60's like *Bonanza* with its good father figure had, for an example, an episode that defended against euthanasia contrasts with programs such as the *Simpsons* that began to appear in the 80's. The latter implicitly promoted the emotions and will acting irrationally in disregard of the principles obtainable through what we know through the senses. Rizzi reminded us that nature comes before grace and that grace perfects nature. Scientism, ignoring nature, breeds a deep and blind authoritarianism where people follow rules without thoughtful understanding of the nature or meaning of the rules. He reminds us that the task we have is an essentially important one. We must discover and learn the powerful principles behind modern physics and teach them in IAP's textbooks. He said, "to get something profound, it has to be rooted in the principles of the first physics."

Randy Nichols received his certificate

recognizing him as a new associate member of the Institute. Randy holds a Master degree from the University of South Florida in Mechanical Engineering and spent 33 years in the aerospace industry. Now, he is dedicated to learning and teaching physics with the broader understandings contained in the *Physics for Realists* textbooks and applying it to advance IAP and its mission.

Dr. Ken Klenk discussed the key persons involved in developing quantum theory. His talk focused on the religion of more than 35 important physicists from Max Planck to Stephen Hawking that shows an increasing percentage of professed atheists among the contributors as the birth moves from the last 1800's into the 1930's. This increase in the percentage of non-Christians ***Story continues on page 3***

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and indeed of an atheistic stance is a reflection of the advance of the empiriometric (equation-based) physics. As the empiriometric method advances and incorporates more and more of the specifics of the physical world, it becomes hard to see the basic physics upon which all stands, including our knowledge of God's existence.

Dr. Klenk also led a discussion of quantum computing at the Friday night session based on the slides of **Dr. Steve Strickland** who was unable to attend. He also discussed quantum entanglement as a possible mechanism to explain a bird's ability to migrate using the Earth's magnetic field.

Dr. Joe Martin reported further on his previous year's discussion of the severe problem of radiation exposure both from the sun and from cosmic radiation which only Sheila Thibeault of NASA Langley seems to be seriously investigating. Dr. Martin showed Langley's estimates of the efficacy of various shielding material thicknesses in meeting NASA's requirements for lifetime exposure limits. Their approach of boron nanotube filled with hydrogen shows the most promise as both a strong structural material for the spacecraft, surface vehicles, and habitat as well as for making space suits for Mars surface exploration.

Dr. Ted Dickel presented a survey of the most current research on the dynamics of bouncing silicone oil droplets. These droplets closely mimic certain aspects of quantum mechanics despite being easily observable with the naked eye. **Drs. Dickel and Strickland** will be looking to incorporate these phenomena into our understanding of quantum mechanics for the textbook. **Dr. Dickel** also presented his data and figures arising from his mathematical implementation of the theoretical evolution of classical and quantum ensembles of superballs confined inside a box. This later work was directed by Dr. Rizzi as part of an explanation of the ensemble meaning of quantum mechanics for the textbook.

Dr. Rizzi presented *Approaches to Quantum Mechanics, The Generic Meaning of Quantum Mechanics*, *Understanding Bell and EPR+Hanson*, *Stochastic Electrodynamics Basic Approach* and its limits, "*Identical" Particles and Spin*, and *Brownian motion and Stochastic Mechanics.* He also presented the outline of the quantum mechanics textbook. The first chapters will address the key experiments, Schrödinger's equation and the need for a statistical approach. Quantum mechanical aspects of single particles as harmonic oscillators and the hydrogen atom will be addressed. Special emphasis will be given to quantum causes and behavior and the classical limit. Then the text will move to discuss multiple particles, fermions and the exclusion principle and how to handle real atoms. There was some discussion about the scattering problem and whether that should be handled in the textbook proper or given in a supplement. The book will then discuss the Mars Theme and treat quantum mechanics problems to be encountered in the Mars expedition. Finally, a discussion of Quantum Field Theory will likely be the concluding chapter. The members were excited that the quantum mechanics textbook will be published by this time next year (note: this expectation has been changed by the flood).

Dr. Murray Daw discussed the de Broglie Bohm interpretation of quantum mechanics, and gave examples by discussing quantum potentials for various familiar textbook problems. He also illustrated work done by him and Dr. Rizzi on how entanglement affects the quantum potential for two-particle systems and illustrated the surprising result that individual fermions (bosons) can sometimes attract (repel); however, when averaged over the ensemble they exhibit their normal behavior of repelling (attracting).

Dr. Dan Welch, *Story continues on page 4*

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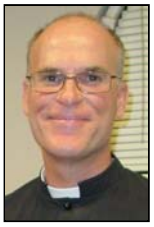
during the Thursday evening session, prepared several experimental setups to illustrate several quantum mechanical concepts, including the wavelength dependence on temperature of a filament, a diffraction method for measuring Planck's constant and a light bench with slits and polarizers that shows the confusion of using standard quantum mechanical explanations.

Participating for the first time this year, **Dr. Dennis Dubro**, who has nearly completed his preparation to become a certified member, contributed to the discussions and problem sessions. He has a doctorate in Applied Physics from the University of New South Wales in Australia and has spent the last 25 years working in the field of metrology.

Fr. Neal Nichols, the IAP chaplain, celebrated Mass each day and was available to the conference attendees for confession. In his homilies, he pointed out the need to learn the truth and to live the truth in the four step way. He said that we are called to seek and love the truth, that it is man's duty to give himself entirely to pursuing it, and to do otherwise is to be unfaithful to our calling and to commit serious sin. He opened the sessions of the conference in prayer, including the recitation of the rosary on Friday after lunch.



Dr. James Stoner has been with IAP since its inception in 2003. He is IAP's facilities liaison at LSU. **David Giroir** provided essential facilities assistance.

Cardinal Burke and Dr. Klenk discuss IAP's Work

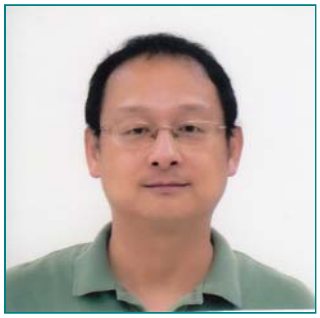
On July 22, 2016, **IAP Certified Member Dr. Kenneth Klenk** met with **Raymond Leo Cardinal Burke** to discuss some of the accomplishments of the Institute for Advanced Physics (IAP), including the *Physics for Realists* textbook series and *A Kid's Introduction to Physics (and Beyond)*. Cardinal Burke and Dr. Klenk discussed the important and essential nature of the IAP work. The fundamental problem with our knowledge of truth lies with a physics that is equational which does not, in its current form, answer questions about what things are. IAP is the only organization addressing this problem at its source. The meeting was at the Shrine of Our Lady of Guadalupe in La Crosse, WI.

Cardinal Burke first learned of the work of the IAP in 2009 from IAP's **Director Dr. Anthony Rizzi**. Cardinal Burke has assisted IAP in its public outreach.

A follow-up meeting with his Excellency and additional members of the Institute is being planned for the beginning of 2017.

It is absolutely false to maintain, with reference to the truths of our faith, that what we believe regarding the creation is of no consequence, so long as one has an exact conception concerning God; ***because an error regarding the nature of creation always gives rise to a false idea about God.*** **St. Thomas Aquinas**

Jian He, IAP Certified Member



Dr. Jian He is an Associate Professor of Physics in the Department of Physics and Astronomy at **Clemson University**. He received his B. S. degree in condensed matter physics from **Jilin University, PR China** in 1991, and his Ph.D. degree from the **University of Tennessee, Knoxville** in condensed matter physics in 2004. He was a research associate at **China Institute of Atomic Energy** conducting neutron scattering study of biomolecules and crystalline materials and a postdoc at Clemson University conducting thermoelectric research.

He joined Clemson University as a tenure track assistant professor in 2008 and was promoted to associate professor with tenure in 2014. His current research interests include the synthesis and characterizations of low dimensional electronic and magnetic materials, superconductors, and thermoelectric materials. He is author or co-author of over 130 peer reviewed publications, five book chapters and three patents. His hobby includes playing soccer, watching football, and reading history books.

He is grateful to be a member of the Institute for Advanced Physics. He is eager to continue the learning process and to begin to contribute to our growth in knowledge in the full sense.

The Institute for Advanced Physics extends our appreciation to
Josiah Jones and **Joan Sargies**
for submitting art work for the cover of our third textbook
Physics for Realists: Quantum Mechanics.
This is the third textbook in IAP's *Physics for Realists* series.
Thank you for your time, talent and contribution.

Stephen Sulyi, IAP Associate Member

Stephen C. Sulyi, O.D. received his B.S. in Biology and Psychology at **Bowling Green State University** and his Doctorate in Optometry from the **Southern College of Optometry**.

He is the owner of a company which he founded nearly 10 years ago that provides optometric services to residents of skilled nursing, assisted living and correctional facilities as well as veterans homes throughout South Carolina and Georgia.

Stephen was introduced to IAP by his friend and member, Anthony DiCarlo, and he completed the Associate Level training under the guidance of Dr. Murray Daw. He has found the *Science before Science* very beneficial to the proper understanding of foundational principles and hopes to build upon this both personally and with others in doing the necessary work of IAP.

Stephen lives in Simpsonville, South Carolina with his beautiful wife Theresa and their two sons, John Paul and Dominic. He is an avid sports fan, always faithful to his Cleveland professional teams and the Ohio State Buckeyes.

IAP office recovers from 1 in 1,000 year flood

Small business owners rescue equipment

Louisiana Gov. Edwards called it a "historic, unprecedented flooding event" and on August 12, 2016 declared a state of emergency. The catastrophic stormed dumped three times as much water on Louisiana as Hurricane Katrina, measuring 2-3 inches every hour in the devastated areas, spanning several days and being called a 1-in-1,000 year event. The flooding was responsible for 13 deaths. The Institute for Advanced Physics (IAP) office is located in the hardest hit area.

On Saturday, August 12, staff members and volunteers worked into the night safeguarding computers, books and removing filing cabinet drawers. It was challenging to find safe places within the office to relocate the items as water surrounded the building, making boat rescue the only means of departure. The "Cajun Navy" (local residents with fishing boats and pontoon boats) worked through the night to bring people to dry land, resulting in 11,000 people taken to emergency shelters. IAP lost all its furniture, floors, and many office supplies and had to rebuild its interior walls and insulation four feet up from the floor. Following the storm, 20 parishes (counties) were designated federal disaster areas. Although IAP's damage was severe, resulting in its being uninhabitable, it was not among the 75% of businesses and homes in its parish which experienced a total loss. IAP, like many small businesses and the majority of homeowners affected, was not located in a high flood risk area and thus did not carry flood insurance. Indeed, IAP offices are part of a larger area that only was flooded because of a highway divider added to the local interstate that acted like a dam when the Amite River flooded, because proper water control features were not provided.

IAP re-opened its doors on September 26th. Under Dr. Rizzi's leadership, recovery work continues into December despite the scarce labor and materials. Dr. Rizzi and the IAP staff are thankful for the way IAP members and many others pulled together to get us back and running. We are proud to be back helping people in the most profound way by addressing the core problem of our culture. To the many of you that helped: thank you for your prayers, financial help and in general for your efforts to help IAP and its families.

The Institute for Advanced Physics is in need of your financial assistance during our recovery efforts. Please consider a donation of any size to help us rebuild and replace furniture. Donations are tax deductible. Donate online at: http://www.iapweb.org/store/ or mail a check to: Institute for Advanced Physics, PO Box 15030, Baton Rouge, LA 70895.

Dr. Martin discusses Manned Mars Mission

At the recent IAP conference, **Dr. Joe Martin** discussed how the theme of the Manned Mission to Mars is being promulgated by five major groups, each with their own unique approach. He discussed the various efforts to send a manned mission to Mars such as those developed by the Mars Society (led by Robert Zubrin), Space-X (led by Elon Musk), Mars One (led by Bas Lansdorf), the NASA effort, and a non-profit, Explore Mars. He identified major drivers and mode of approach as well opinions about the various approaches' viability.

In summary, the Mars Society seems to have the most thought out and realistic *engineering* plan, with specific quantitative approaches to the necessary technologies and costs and with innovative cost saving approaches that follow the theme of " live off the land, don't try to bring everything with you" Space X seemed to have the most practical approach.

Space X has gone ahead with the actual building of a launch vehicle and crew capsule that could be used to perform the initial manned trips to Mars using entirely their own financial and technical resources, borrowed from Elon Musks's other businesses. These efforts are kept going by selling launches to NASA for Space Station resupply and also to geosynchronous communication satellite commercial customers. Subsequently, Robert Zubrin of the Mars Society offered a more recent version of his mission plan using the Space X hardware approach.

The Mars One approach, calling for establishing a colony on Mars by calling on astronauts to be rigorously selected with the understanding that it is a one way mission – travel to Mars, establish a colony, learn to live there, and do not plan to return. The funding for the project is seen as a giant reality television show raising billions of investment dollars by selling rights to a TV program depicting astronaut selection, training, travel to Mars, establishing the colony, and living and working on Mars. It seems to lack any real engineering, budget, and schedule realism.

The NASA approach has been plagued by the realities of getting taxpayer dollars to do the necessary design, engineering, and construction for such an undertaking. This seems to have resulted in a plan-free approach that is working on all aspects of technology without too much coordination of how they all fit into the non-existent plan. In the oft-voiced opinion of Robert Zubrin this non-plan approach has inadvertently spawned concepts that promise to increase the overall costs to 10 times those of his well thought out plan, making the difficulty of raising tax dollars a self-fulfilling prophecy.

Finally, Explore Mars is trying to bring together all the advocates to coordinate plans and to share expertise. They have started annual conferences documented by the Humans to Mars Report. It seems significant that the 2016 report had no participation by or mention of Mars One, but did have significant participation from NASA.

"Feynman would have loved this [the work of Institute for Advanced Physics]" **Mike Baskes**, Sandia National Lab
Former student of famed physicist Richard Feynman, who was considered by many to be the Einstein of his day and know for his distinguished work on the NASA Challenger disaster presidential commission

University students use Physics for Realists principles in high school physics lab

Associate member Anthony DiCarlo invited Clemson's Society of Physics students out to Belton-Honea Path High School (BHP) where he teaches math and physics. The Society assisted Mr. DiCarlo's students with two different labs this (fall) semester: The Society members had learned IAP's *Physics for Realists-Mechanics* and *E&M* (see below). The first lab investigated conservation of momentum in elastic and inelastic collisions, and the second lab allowed students to investigate the relationship between force, mass, and acceleration. Mr. DiCarlo's high school lacks the materials needed to do these labs, so the Society brought out the equipment and helped explain how to complete them. This allowed Mr. DiCarlo's students to experience labs that freshmen physics students at Clemson must complete as part of their curriculum.

The Clemson students who went out to BHP to help Mr. DiCarlo's class were either current or former students of Dr. Murray Daw, who is a certified IAP member and IAP faculty member as well a physics professor at Clemson. Dr. Daw opted out of teaching graduate-level courses many years ago in order to teach the freshman Mechanics course and Electricity and Magnetism course using Dr. Rizzi's *Physics for Realists* textbooks. The Society of Physics students have praised Dr. Daw's class and the *Physics for Realists* textbooks. They talked with Mr. DiCarlo's students about how unique PFR is, and one student quizzed Mr. DiCarlo's students on their understanding of the principles they had learned.

Mr. DiCarlo is very thankful to have Dr. Daw and his students so close by so that he can collaborate with them in building a solid physics program at his high school.

Bonni McKinney and Lucas McKown, university physics students who learned the full physics (as discovered by IAP and presented in its textbooks) help local high school students

Nick DiCarlo IAP Volunteer Member

Nick DiCarlo is a **Volunteer Member**. Nick lives in Duluth, Georgia with his wife, Liz, and their two children. He is the twin brother of Anthony DiCarlo, who has been an Associate Member the Institute for Advanced Physics (IAP) since 2011. Nick became interested in the IAP through various conversations with his brother and reading *A Kid's Introduction to Physics (and Beyond)*. After requesting to become a Volunteer Member, Nick began to go through *The Science Before Science* with his brother and another friend. They completed the study group in July 2016. Nick has thoroughly enjoyed learning about first principles through his reading of the aforementioned books, several of Dr. Rizzi's articles, and also by watching some interviews featuring Dr. Rizzi. As part of his Volunteer Membership, he is working on accumulating links to various IAP member interviews to be uploaded onto a web page. Noting his hope to play a part in the mission of the Institute, Nick says, "I am excited to continue learning for myself, and hope to help in making the information that Institute for Advanced Physics provides become more widely known."

Resources on IAP's online magazine

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 various topics.

Historic Discovery: Gravity Waves!
View gravity wave effect on man animation
Is there in Truth, Beauty?
Is Your Computer Real?
How to Learn in Four Steps
A Brief History of Nothing
How Do I Know My Hand Causes Movement?
The Problem of Our Failing Culture and its Solution
Answering Dawkins on Simplicity of God

About the author: ***Anthony Rizzi, Ph.D.,*** *founder and Director of The Institute for Advanced Physics (a thirteen-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 physic's degrees from MIT and Princeton University. Prior to IAP, he was senior scientist at Cal-Tech's Louisiana LIGO and taught at LSU.*

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www.iapweb.org/iapmagazine.htm

LIGO Breaking News…Again…

The LIGO gravity wave experiment, which Dr. Rizzi was integrally involved in the development of, announced information through a press release on June 15, 2016. The LIGO gravitational wave detectors at both the Livingston Louisiana and the Hanford Washington sites have identified a second signal from two black holes (some 1.4 billion light years away) in their final orbits and then their coalescence into a single black hole. This event was seen on December 23, 2015. With these two confirmed detections, along with a third likely detection made in October 2015, scientists can now start to estimate the rate of black hole coalescences in the Universe based not on theory, but on real observations.

The second signal event differed from LIGO's first gravitational wave observation in three important ways: (1) It came from overhead or underfoot unlike the first's southeast location; (2) It was less massive which made the signal weaker. This allowed scientists to observe more orbits and make a more precise comparisons with General Relativity; and (3) One of the black holes was spinning like a top, which suggests that the object has a different history.

LIGO's next observing interval will start in the fall of 2016. With improved sensitivity, scientists expect to see more black hole coalescences and possibly detect gravitational waves from other sources, like binary neutron-star mergers.
Image jpl.nasa.gov