

# The Institute News

- 20th annual summer conference at Louisiana State University
  - Conference photos, including Thomas awards
  - Conference physics experiments illustrate quantum mechanical related phenomena
- Heroic U.S. Air Force Captain Hoffman awards combat flag to DiCarlo and IAP
- Dr. Podila teaches special Physics for Realists-Mechanics class
- New Quantum Field Theory study group
- “What is America?”: Dr. Rizzi joins Fr. Mitch Pacwa on EWTN Live
- New Associate Members: Blatchford, Hogan, Izard, Robson, and Scheuer
- Member Activities: Women’s SBS study group; Luna Clemson graduate student talk; Coniglio Christmas concert; PFR class for Clemson University professors; and SBS college student study group
- Physics & Culture magazine: *Love and Friendship* by Dr. Anthony Rizzi

## Twentieth Annual IAP Members Conference

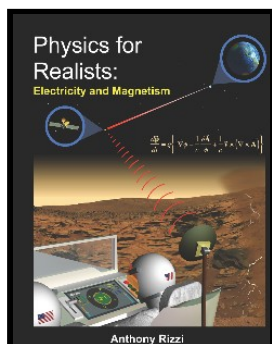
by Ken Klenk, Ph.D., IAP Certified Member  
 photos courtesy of Maikel Garcia



(left to right)(standing) Maikel Garcia, Fr. Neal Nichols, Anthony Coniglio, Benjamin Luna, Anthony DiCarlo, Giuseppe Rizzi, Frank Camacho, Dr. Jim Stoner, Fletcher Williams, Dr. Anthony Rizzi, Ethan Robson, Dr. Stephen Strickland (holding laptop featuring online participants Randy Nichols, Dr. Ken Klenk, and Dr. Dan Lejeune), (front row, kneeling) Ed Howard, Brendan D’Amato, Dr. Murray Daw, James Louviere, (not pictured) Dr. Rama Podila, Don Caffery, Nicolo Rizzi, and Miss Kateri Rizzi

*Annual conference story continued from page 1...*

The Institute for Advanced Physics' (IAP) 20th annual summer conference, *Physics for Realists XIX: Quantum Field Theory IV*, was held on July 20-23, 2022 on the campus of Louisiana State University. To kick-off the conference on Wednesday afternoon faculty member **Prof. Murray Daw** conducted an interactive session called **Primer on Physics for Realists: Mechanics and E&M**. He reviewed

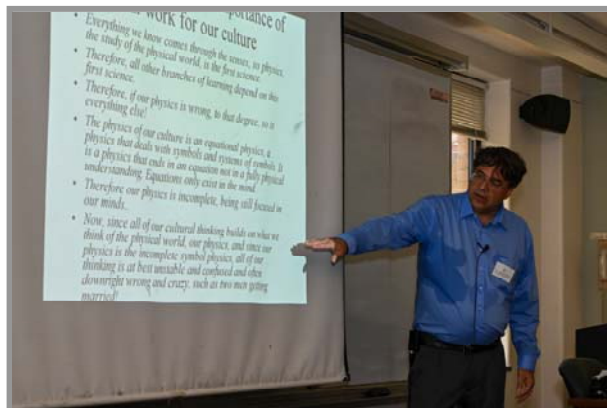


many salient features of the textbooks, *Physics for Realists – Mechanics* (PFR-M) and *Physics for Realists - Electricity and Magnetism* (PFR-EM), that the Institute published in 2008 and 2011, respectively. This session provided an excellent opportunity for the participants to review their understanding of the fundamental physical principles at an advanced level of specification.

Wednesday evening the attendees gathered for a round table discussion of various topics including the **4-steps in learning, virtues needed for IAP work, and the false definition of intelligence** that is widespread in our culture today. This led to a discussion of



friendship based around Dr. Rizzi's article entitled *Love and Friendship: What is Love? What is Friendship?*, which was published in IAP's **Physics and Culture** magazine around the time of the conference [iapweb.org/magazine](http://iapweb.org/magazine). All kinds of deep, important insights came out due to this amazing article.



Thursday morning, **Dr. Anthony Rizzi**, IAP founder and Director, began the conference with a **welcome and introduction**. This included a sobering reminder about the urgency of the problem of *scientism*, which is our habitual thinking derived from the equation-alone base of our modern culture. Dr Rizzi walked participants through the IAP central theorem (<https://iapweb.org/mission.htm>),



which proves that the equation alone thinking is eating away at everything good in our culture and in each one of us, causing us to fall further and further into a *Matrix*-like kind of existence. **Story continues on page 3...**

*Annual conference story continued from page 2...*

The conference then turned to the topic of quantum field theory. Dr. Rizzi began by discussing the general nature of the next textbook on quantum field theory (QFT), which we can call, for now, Physics for Realists-QFT (PFR-QFT). Dr. Rizzi's talk gave us the physical understanding of Lagrangian dynamics. Dr. Rizzi also discussed in a fully physical way: Hamilton's Principle and the principle of least action and how action links to quantum mechanics; the Hamilton-Jacobi equation.

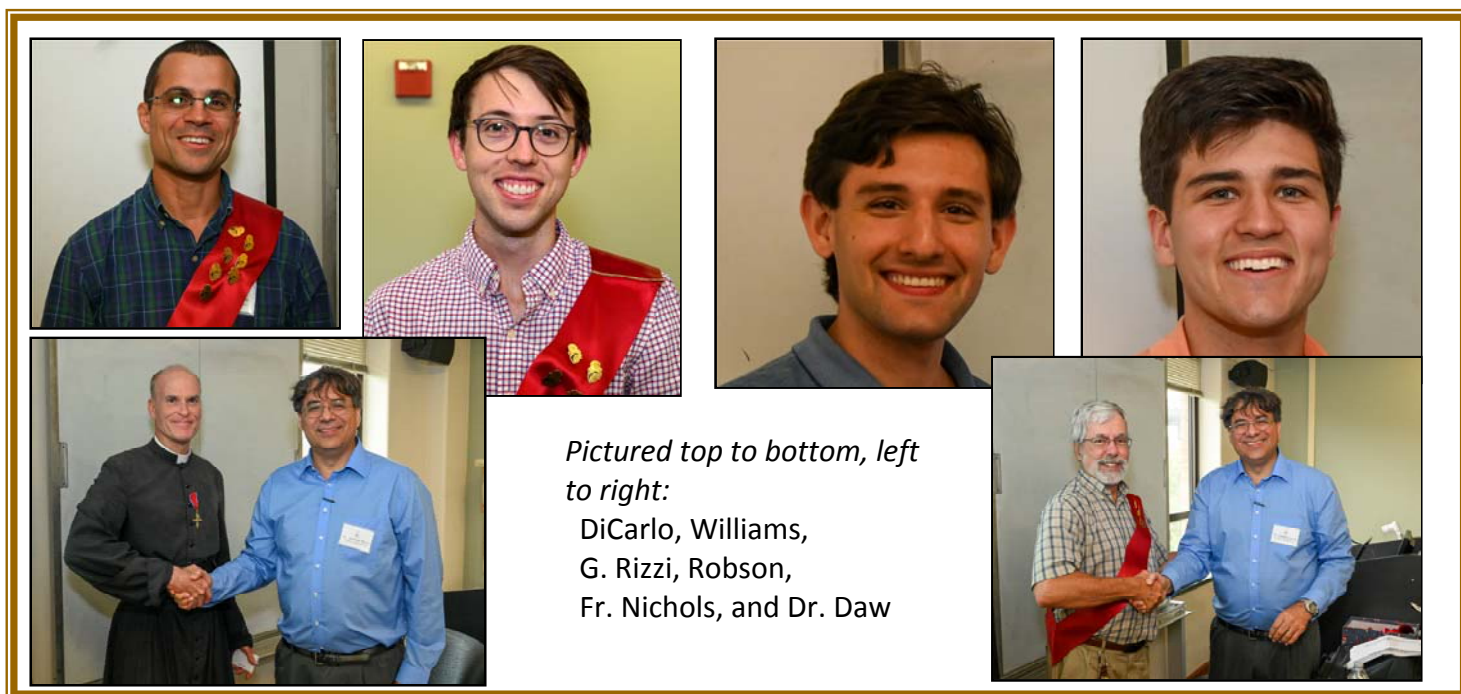


Leaving the core physics to address the accomplishments of our members, the conference moved to an awards ceremony. Beginning with some unfinished business from

last year's awards ceremony, **Dr. Rizzi** completed the presentation to **Father Neal Nichols**, IAP Chaplain. Fr. Nichols was given the actual medal that was not ready last year. He was given a **Distinguished Service Award** for his 19 years of service to the IAP. Service awards were given to other members as well. Each **Thomas Gold Award** recognizes significant act or acts of service to the IAP and the **Thomas Purple Award** recognizes the same when it involves a special sacrificial character as well. Barring exceptional cases, a member only receives the award after 5 years of membership.

**Dr. Murray Daw** received 5 gold awards and 1 purple award for all of his accomplishments at the IAP over the years. **Anthony DiCarlo** received 4 gold and 3 purple awards; **Fletcher Williams** received 3 gold and 3 purple awards; **Giuseppe Rizzi** received 2 gold awards; **Ethan Robson** received 1 gold and 1 purple award; and the following members each received 1 gold award: **James Louviere**, **Dr. Ken Klenk**, **Dr. Dan Lejeune**, **Dr. Stephen Strickland**, **Maikel Garcia**, **Frank Camacho**, **Fr. Neal Nichols**, **Don Caffery**, and **Randy Nichols**.

*Story continues on page 4...*



*Pictured top to bottom, left to right:*  
 DiCarlo, Williams,  
 G. Rizzi, Robson,  
 Fr. Nichols, and Dr. Daw

*Annual conference story continued from page 3...*

The Thursday afternoon session began with a discussion of **path integrals, Brownian motion, and quantum mechanics**. Dr. Rizzi then connected the path integrals to the Schrödinger equation. Each talk built on the subject from previous years.



Assistant Professor of Practice **Fletcher Williams** addressed **Special Relativity** as given in the PFR-Mechanics textbook. He discussed how in this past year, **Dr. Ted Dickel** and he led a group of many of the IAP members and IAP students through Chapter 10 of PFR-M driving home the details of the essential work done in the PFR textbook. The principles behind this important topic (such as the principle of integrity and the need for a maximum apparent speed and operational simultaneity) were explained and used. One learns a great deal more about impetus in special relativity, such as the fact that impetus changes the mass and length of things.

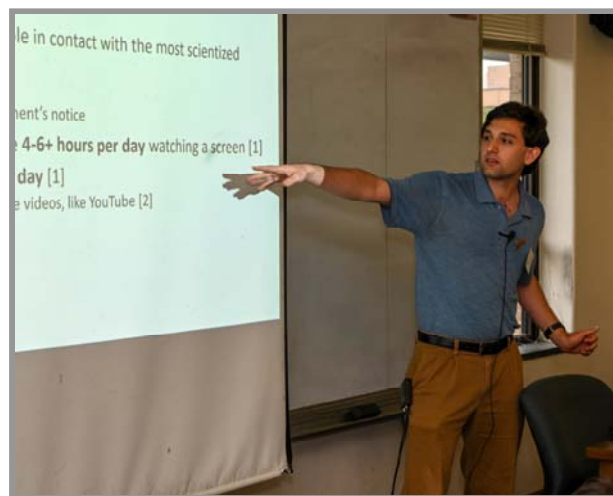
Dr. Rizzi continued his presentation of material that is being prepared for the **PFR-QFT** text book. He discussed the Klein-Gordon equation and the Dirac equation especially in their non-relativistic limit. He went on to



discuss the Aharonov-Bohm effect and its importance at the center of quantum mechanics. He showed the E&M structure of quantum mechanics, always pointing to the physical meaning. He went on to show the relation between Fourier transforms and quantum mechanics.

There were two **breakout sessions** in the afternoon. One group broke out to discuss problems for the QFT textbook and another group to discuss QM and determine and list problems in the popular understanding of QM that should be addressed in the text.

Several presentations followed before adjourning for the afternoon: Associate Member **Giuseppe Rizzi**, gave an update on his work in evaluation of **how physics effects the lives of young people**.

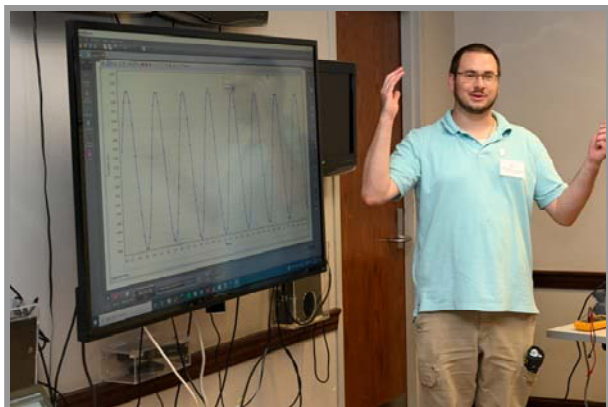


Associate Member **Frank Camacho** (left) and Certified Member **Dr. Kenneth Klenk** (right) discussed the **IAP virtues**, making suggestions for further development and education.

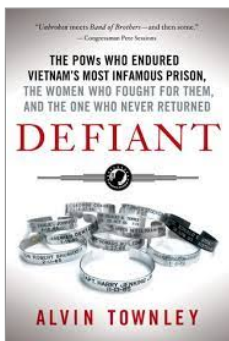


*Story continues on page 5...*

Annual conference story continued from page 4...



After dinner, the members participated in some **experiments** that Certified Member **Dr. Steven Strickland** had set up. Among others, there was a classical version of the quantum eraser experiment; gas discharge tubes to reveal more of the quantized nature of atoms; and the Einstein-de Haas effect. *See more detail in a related article in this newsletter.*



**Fletcher Williams** discussed the book **Defiant** which is about American POWs from the Vietnam War. The book focuses on a special group of men named the “Alcatraz 11” who led the resistance among the American POWs

against the cruel control of the North Vietnamese prison camp authority. As one attendee observed after the presentation, “these were a different breed of men.” Everyone was amazed to hear the ways in which these men embodied virtue—in their fortitude, ingenuity, vigilance as well as their reverence for God and their sense of duty to their country. Through the most brutal



torture—both physical and psychological—they came out triumphant, and they returned to their country with honor. Especially interesting was the role that the POW wives played in the rescue of these men from North Vietnam. There was a whole story of the steps taken by the POW wives (interestingly, led by some of the wives of the Alcatraz 11!) to band together and generate a groundswell of support from the whole nation. This was what ultimately gave the impetus for the Nixon’s administration’s public condemnation of the North Vietnamese, first bringing the POWs reprieve from torture, and finally bringing them home. Seeing the virtues incarnated in these men and their wives was deeply inspiring for the members present, and in the discussion that followed, they discussed wanting to strive for the same caliber of virtue in the fight against the scientism. I and all present felt this call to articulate and defend the deep truths we have been given in the IAP in the same way as these gallant men.

Friday morning sessions began with a review of the **Table of Contents** for the *Physics for Realists: Quantum Field Theory* textbook. One decision still needing to be made is how much discussion of gravity should go into the PFR-QFT text.

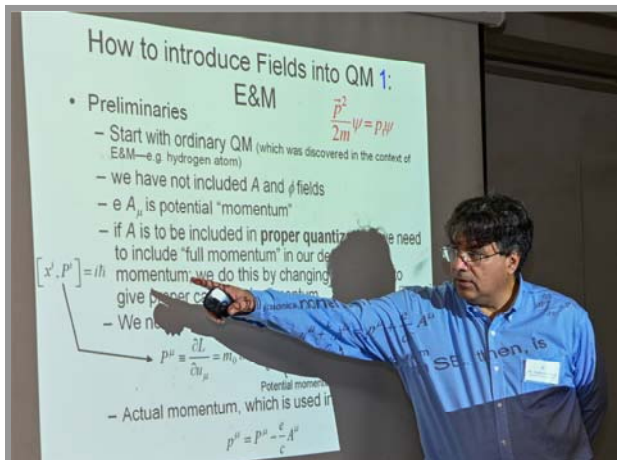


Membership Director **Anthony DiCarlo** addressed the topic of **Living What You’ve Learned, Step 3ing IAP III**. He addressed the urgent need to integrate the truths we’ve learned through IAP into our lives so

that we can defeat the scientism that is destroying our culture and robbing us of our true happiness. The IAP members have a special responsibility in this regard because of the education we have received through the IAP. *Story continues on page 6...*

*Annual conference story continued from page 5...*

The highlight of the morning session was **The Scientism After Science** presented by **Dr. Rizzi**. Scientism is the taking of modern science as the first and only way of knowing. This erroneous thinking is at the base of today's culture and is causing its decline.



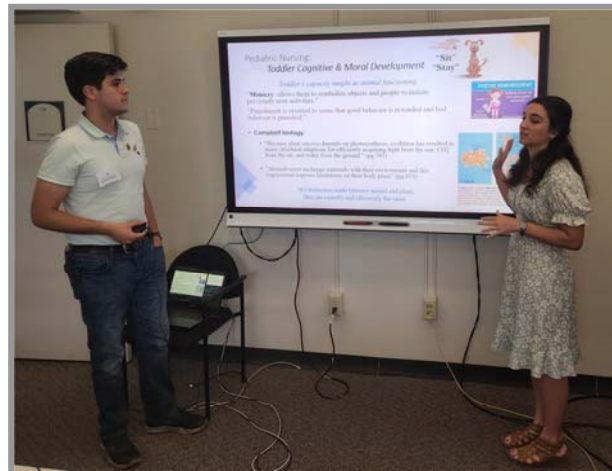
**Dr. Rizzi** continued his discussion of the underlying understanding of Quantum Field Theory in the afternoon session in his talk on **potential momentum to the Strong Force**. **Dr. Daw's** presentation - **More on the Standard Model** discussed the standard model including the successes and limits of the standard model. **Dr. Rizzi** concluded the quantum field theory discussion with a discussion of the **de Broglie-Bohm formalism** as it appears in the case of quantum field theory.



At the same time, there was a breakout session of the **Biology Group** to discuss the companion guide for **Biology** by Campbell led by **Fletcher Williams**.

Volunteer Members **Ethan Robson** and Miss

**Kateri Rizzi** presented **Scientizd Biology Infection Revealed by Nursing Education**.



There was also a breakout group headed by **Anthony DiCarlo** to discuss **Building Principles**, in particular, the IAP virtues.

Certified Member **Dr. Rama Podila (left)** gave a presentation entitled **Finally: Experiment Challenges the Standard Model, Maybe**.



*Story continues on page 7...*

**The Institute for Advanced Physics**  
*Twenty-first Annual Summer Conference*

**Physics For Realists XX**  
**Quantum Field Theory V**

Louisiana State University, Baton Rouge, LA  
*Invitation only*

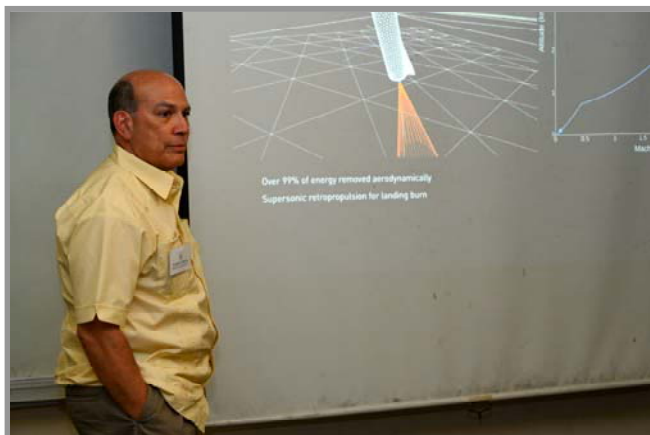
**July 19-July 22, 2023**

Noon lunch and 2pm review on Wed, July 19th  
 Also includes special session on Tues evening July 18th.

Annual conference story continued from page 6...

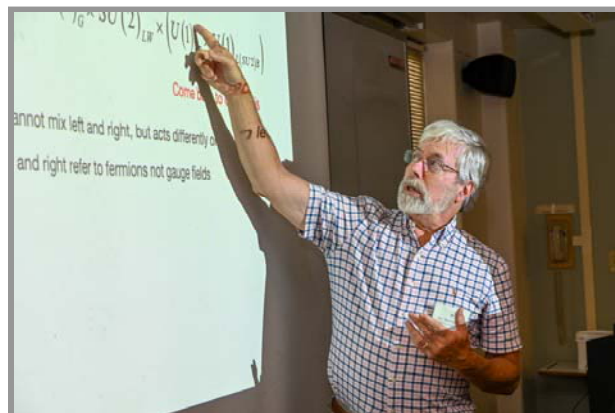


After the breakout sessions, **Anthony DiCarlo** spoke directly to the conference participants discussing ideas on how to better disseminate and teach the broad and deep body of work of the Institute for Advanced Physics especially to their own families but also the larger community. He pointed to the resources that are available including the *Physics for First Communion* video series based on *A Kid's Introduction to Physics* book; the five episodes of *Decision for Truth*; reading with their families; praying the IAP prayer card; *A Kid's Introduction to Physics (and Beyond) I and II*; making sure their public library has *The Science Before Science*; and citing the Institute for Advanced Physics as the source of the information that they share.



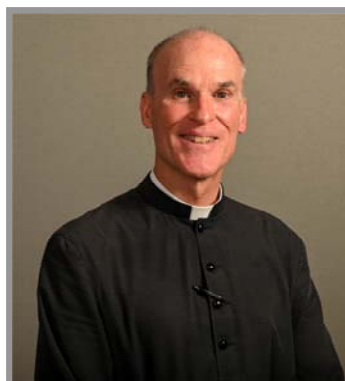
**Frank Camacho** gave an update on the **Manned Mission to Mars**. He talked about SpaceX, its Starship/Super Heavy rocket system, and the Starship's first full-scale orbital test flight, now planned for sometime in 2023.

Technical specifications of the behemoth Starship/Super Heavy rocket system were presented. He discussed the ambitious schedule that SpaceX has set to accomplish a manned mission to Mars by the end of this decade.



Friday evening's session began with **Dr. Daw** discussing the ***Collapse of the Collapse***. In his talk, following PFR-QM, he looked at the standard understanding of quantum mechanics, which supposes a 'collapse of the wave function' and showed that it is false. There is no collapse.

**Frank Camacho** picked-up from last year on the ***Kid's Introduction to Physics II: Members up to Bat: 3 More Pitches***. KIP II addresses Electricity, Magnetism, and Quantum Mechanics. He presented three more questions for the members to answer. **Dr. Strickland** gave his annual update on **Quantum Computing**. **Fletcher Williams** gave a talk on **Feser, Wallace and Smith**. The evening concluded with a continuation of the members' discussion of friendship from Wednesday night.



**Father Nichols** celebrated Mass every morning for the members and was available for confession before Mass. He participated in all of the sessions of the conference,

Story continues on page 8...

*Annual conference story continued from page 7...*  
 leading and concluding each session with prayers and hymns.



Article contributor Dr. Ken Klenk has been an IAP Certified Member since 2006. He works as an independent consultant. He has managed space and earth science projects in support of NASA Goddard Space Flight Center, Jet Propulsion Laboratory and the

U.S. Geological Survey.





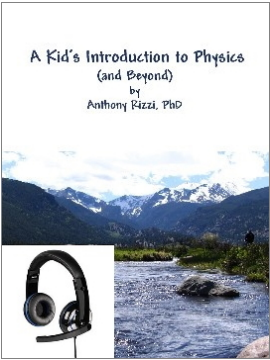

Photos courtesy of Maikel Garcia. Maikel has been an IAP Associate Member, Level II, since 2013. He is currently teaching: Adjunct Professor, Physics and Astronomy at Odessa College; Adjunct Professor, Mathematics at

Austin Community College; Instructor at Leander High School, Leander, TX.




**Audio** copies available:  
*Science Before Science*  
 and  
*A Kid's Intro to Physics (and Beyond)*  
 at  
[www.iapweb.org/store/](http://www.iapweb.org/store/)  
 and articles available at  
[www.iapweb.org/iapmagazine.htm](http://www.iapweb.org/iapmagazine.htm)

- *One Ring Rules Them All*
- *Is there in Truth, Beauty?*
- *How to Learn in Four Steps*
- *Productive Conversation*



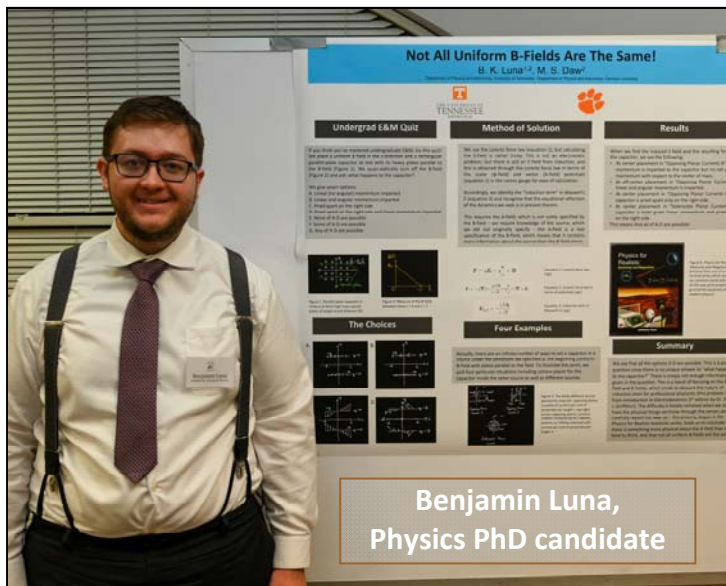


# Conference Photos



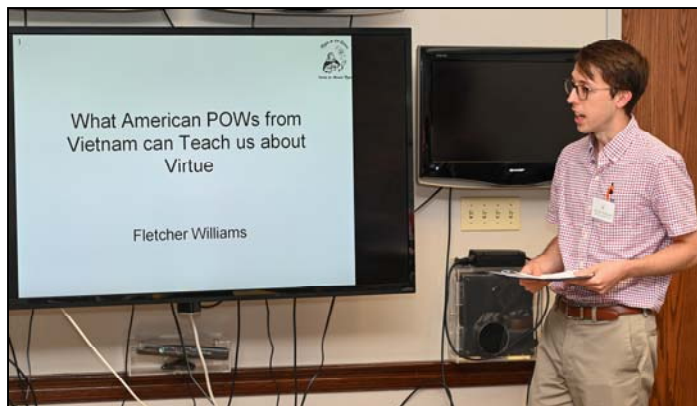
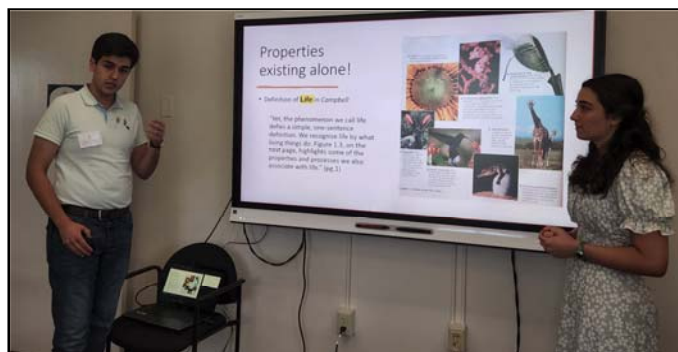
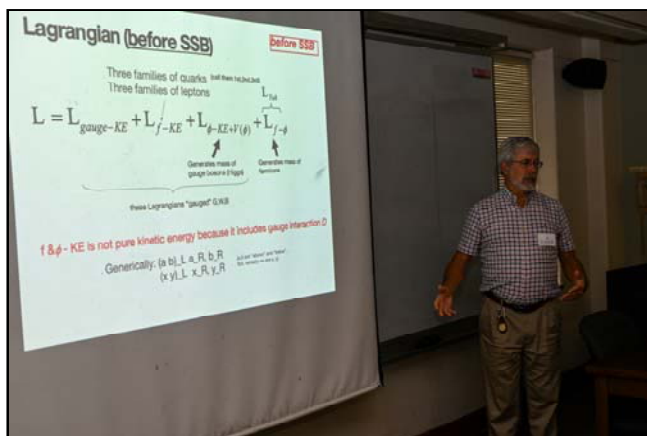
*Photo above: James Louviere, videographer*

*Photo right: Maikel Garcia, photographer*



**Benjamin Luna,  
Physics PhD candidate**



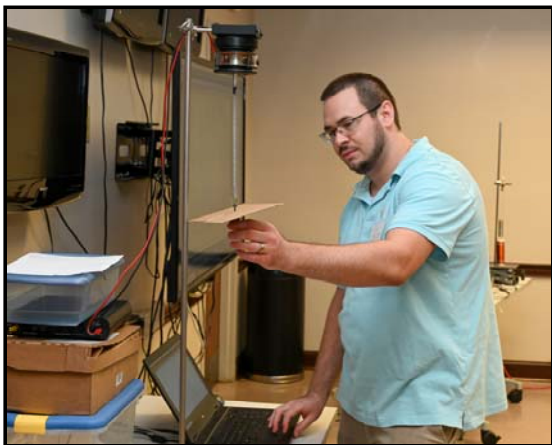


## Conference Physics Experiments

by Dr. Stephen Strickland, Certified Member  
photos courtesy of Maikel Garcia, Associate Member

On Thursday evening, July 21<sup>st</sup>, at the Institute for Advanced Physics (IAP) Annual Conference, **Dr. Stephen Strickland** conducted several experiments demonstrating fundamental physical principles for discussion among the IAP members.

### (1) Simple Harmonic Motion & the Driven-Damped Oscillator



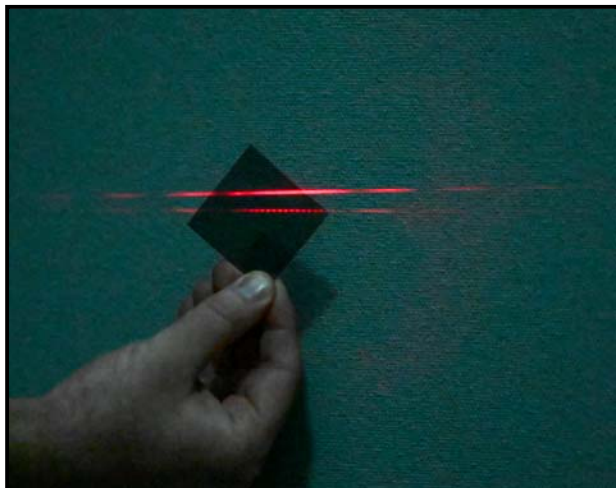
Dr. Strickland opened by presenting a vertical mass-spring oscillator as a way of demonstrating some of the complexities of the principles of impetus, mass, and force. Also, such harmonic oscillators are empiriometrically a core part of quantum field theory. A small body with mass is held at rest below equilibrium and then released. The force of the spring and gravity combine to give a net upward force, which continually increases the strength of the upward impetus of the body, causing it to accelerate up until it passes equilibrium. After this point, the spring force and gravity combine to apply a downward net force on the body, decreasing its upward impetus until it slows down to a halt at a peak height. A symmetric process happens as it moves downward, accelerating to equilibrium and then slowing to a momentary stop at its initial position. The motion will repeat over and over again.

By adding a cardboard parachute to the body, he introduced an additional force, a drag force. Being opposed to the body's motion,

this drag force always acts to decrease the strength of its impetus, resulting in the gradual exponential decay of its oscillatory amplitude.

Next, he removed the cardboard parachute and added a mechanical vibrator at the top of the spring so as to drive the mass-spring oscillator. On seeing the oscillation when driven off-resonance and then on-resonance, the group discussed the principled explanation of resonance, i.e., that when the direction of the driving force and impetus are synchronized, the force will always increase the intensity of impetus, thus increasing the oscillation amplitude, but when the driving force and impetus are out-of-synch (because, e.g., the driving frequency is off in some way), the force will sometimes deactivate impetus, thus decreasing the oscillation amplitude. Thus, in order to dump energy into the oscillation, the driving force must be in synch with the impetus and remain in synch. This principled statement has as a consequence that the driving frequency must match the natural frequency of the oscillator.

## (2) Classical Version of the Quantum Eraser Experiment

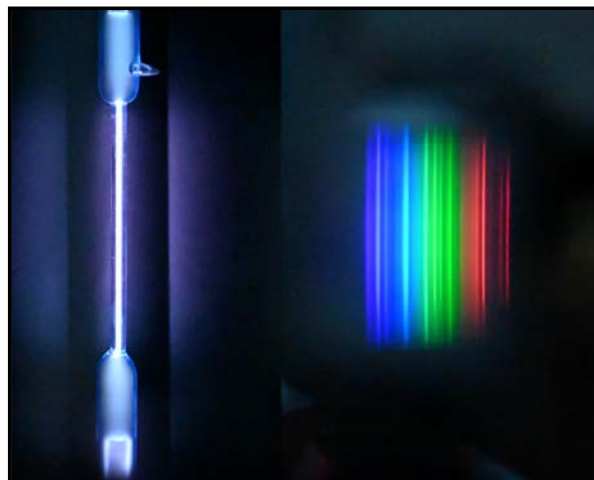


Dr. Strickland began by showing the inference patterns formed by laser light diffracting through a single slit and a double slit. He then covered both slits of the double slit with polarizers. The first slit was covered with an up-down polarizer while the second was covered with a left-right polarizer. In so covering, the A-field of the light from the first slit (up-down) can no longer constructively or destructively interfere with the A-field of the light from the second slit (left-right), and so the double slit pattern vanished leaving only the single slit pattern. Dr. Strickland then held up a third polarizer, a selecting polarizer, near the screen which he could use to select out light that had only come from the first slit (up-down polarized) or light that had only come from the second slit (left-right polarized), and in both of those cases, the interference pattern remained that of a single slit. However, if he took the selecting polarizer and held it diagonally, he could select light from both filters while also re-polarizing the light along the diagonal axis. The light could then constructively and destructively interfere again and thereby regain the double-slit interference pattern. This occurs down to the lowest light levels, where quantum effects are seen.

Similarly if a series of electrons were to pass through a double slit, they would yield

the double slit interference pattern. The fully physical principles behind why such an interference pattern is produced by a series of individual electrons is given, for the first time, in *Physics for Realists: Quantum Mechanics* (PFR-QM). If we were to measure which slit the electrons went through, then the double slit pattern would vanish and become a single slit pattern, akin to what happens when we put polarizers on the double slits of the laser experiment. Remarkably, if we "undo" our measurement as to which slit the electron went through, the double slit pattern re-emerges. In standard explanations of this effect, the "collapse of the wavefunction" is invoked, explaining that nothing is there until you measure it. Thanks to the principles in PFR-QM, the grounded explanation is now given, not forcing us into non-sensical statements about the electron not having a place till we look at it.

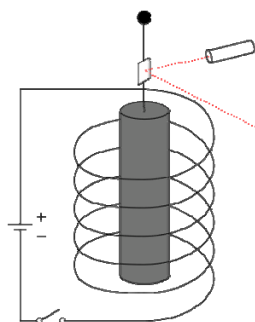
## 3) Gas discharge tubes



To reveal more of the quantized nature of atoms, various gases (hydrogen, helium, and oxygen) in tall glass tubes with electrodes on either end were used. On setting a large voltage (5 kV) across the electrodes, the tubes lit up in the same way that neon signs do. The large electric field drove electrons through the gas such that upon collision with gas atoms, the atoms would be excited. As the atoms relaxed

back to their ground states, they would emit light. With the aid of a diffraction grating, we took the composite color of the excited gas and separated out the constituent pure colors. These pure colors presented a discrete spectrum revealing something more of the quantized nature of the atom.

#### (4) Einstein-de Haas effect



Attribution:  
Jasper Olbrich, CC BY-SA 3.0  
<<https://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons

Originally titled, "Experimental proof of the existence of Ampère's molecular currents," the experiment obtains a measurement of the spin gyromagnetic ratio (ratio of the magnetic moment to its angular momentum) of an electron. It does so by suspending an iron rod longitudinally from a thin string such that it hangs inside of a cylindrical coil of wire and then making measurements of the angular momentum and magnetization resulting from a series of magnetic interactions with the cylindrical coil.

A current is turned on in the coil which produces an A-field inside the coil. This A-field produces a magnetization of the iron rod. This means that some of the orbital and spin angular momenta of the electrons in the rod are changed. As usual, the forces are such that impetus is caused in a way that always conserves angular momentum. Empirically, in order to conserve angular momentum, the rest of the rod acquires angular momentum in the opposite direction which leads to the rod acquiring an angular speed. So, the rod begins rotating, for example, clockwise.

Now, the string-rod system forms a torsion balance, which means that the rod experiences a counter force when it rotates. Thus, upon rotating, it enters into an oscillatory motion, twisting and untwisting the string in a periodic fashion. Under the torsion of the string, it gradually slows its rotation, eventually reversing it. The direction of the current is reversed, causing the magnetization to reverse, which then increases the rod's angular momentum.

By driving the current in the solenoid at the resonance frequency of the torsion balance, we accumulate more and more angular momentum from subsequent reversals of the currents. In this way, we built a small but detectable rotation. To reveal the very small rotations of the rod, a laser beam was reflected off a mirror on the rod, so as to shine onto a screen a large distance away, and thus amplify the observation of the rod's rotation. When undriven, the torsion balance would gradually slow, and the laser dot would become still. However, as explained, when the solenoid was activated, the laser dot would oscillate with increasing amplitude, thereby revealing the angular momentum of the rod.

Were one to carefully measure the ratio of the magnetic moment of the rod to angular momentum imparted to the rod, this gyromagnetic ratio would be directly related to the electron charge to mass ratio. The classical prediction holds the gyromagnetic ratio to be exactly half the charge to mass ratio; however, on close examination, one would find this experiment to yield a ratio 1.9x larger than the classical prediction. This is primarily due to the fact that electron spin, although analogous to angular momentum, is different and results in a gyromagnetic ratio of 2x, a major result of quantum field theory. The additional minor effect in the experiment that results in the lesser ratio of 1.9x is the small presence of electron orbital motion contributing to the magnetization of the rod.

*Experiment photos courtesy of Maikel Garcia*

## Heroic U.S. Air Force Captain Hoffman awards combat flag to DiCarlo and IAP



U.S. Air Force Captain Chris Hoffman awarded the Distinguished Flying Cross medal (U.S. Air Force photo by Tech. Sgt. Alex Fox Echols III)

Another study group based on *The Science Before Science* (SBS) by Dr. Anthony Rizzi led by Institute for Advanced Physics (IAP) Associate Member **Anthony DiCarlo** wrapped up in Fall 2022. Mr. DiCarlo was assisted by IAP Associate Members **Frank Camacho**, **Ed Howard**, and **Brian Lane**. The group met via Zoom every other week from late February to early October to learn the essential material contained in SBS; the group members shared insights, asked questions. *A Kid's Introduction to Physics (and Beyond)* and a few of the articles from the IAP *Physics and Culture* online magazine were also covered. The group members expressed excitement about the material and gratitude for the opportunity to be part of the study group.

One of the participants in this study group was **U.S. Air Force Captain Chris Hoffman**. He actually joined an SBS study group with Mr. DiCarlo in 2021, but his participation in the group got interrupted when he was deployed to help evacuate refugees from Afghanistan as part of the United States' Operation Allies Refuge. Captain Hoffman ended up performing heroic acts in the completion of his

mission and was awarded the **Distinguished Flying Cross medal**, the highest aerial achievement in the Department of Defense, on November 21, 2022!

When he returned from his mission, Captain Hoffman was eager to resume his study of SBS, so he joined the group that started meeting in February. Captain Hoffman was so grateful for all that he learned through the IAP that on December 9, 2022 he presented Anthony DiCarlo and the IAP with a flag that accompanied him on the mission for which he was awarded the Distinguished Flying Cross medal! The flag was accompanied by a certificate (pictured below along with the flag) that reads:



***“Let it be known that this flag of the United States of America was flown on MOOSE 92 tail 02-1108 during the period of darkness 30-31 August 2021 for JOINT TACTICAL EXFILTRATION: KABUL in support of OPERATION ALLIES REFUGE in the final hour of the American presence in Afghanistan. This flag represents the worldwide will and resolve of the United States Air Force and the C-17 Special Operations Division. It is proudly presented to ANTHONY DICARLO and THE INSTITUTE FOR ADVANCED PHYSICS in thanksgiving for their patient devotion to instructing others in fundamental truths.”***

Captain Hoffman understands that true freedom begins with learning foundational truths and integrating those into one's life. Anthony DiCarlo and the IAP are honored by Captain Hoffman's gesture and are very grateful for all of his service to our great country and for his testimony to the importance of fundamental truths!

**Physics for Realists:  
Mechanics special class  
taught by Certified Member  
Dr. Rama Podila**

During the Fall 2022 semester, in addition to his very busy schedule, IAP Certified Member and Clemson professor of physics **Dr. Rama Podila** taught a special course using *Physics for Realists: Mechanics* (PFR-M) by Dr. Anthony Rizzi for Associate Humanities Member **Brendan D’Amato**, **Captain James Scheuer**, United States Space Force, and **Mr. Christian Captain**. The course began shortly after the normal Clemson semester began and met on Tuesday and Thursday evenings. The group was able to cover a significant amount of PFR-M. For Brendan and Christian, this class was their first physics class at a university level. It was certainly a rigorous and challenging course, and the common-sense approach and clear explanations contained in PFR-M helped everyone to get a more grounded understanding of freshman mechanics! Brendan, James, and Christian are all incredibly grateful for the time and care



that Dr. Podila gave to each lecture throughout the semester, and are looking forward to learning more!

*Reported by  
Christian Captain, Clemson  
University physics major*

Institute for Advanced Physics  
IAP Magazine online

**Journal of Physics and Math**

[https://www.iapweb.org/iap\\_journal\\_math\\_phys.html](https://www.iapweb.org/iap_journal_math_phys.html)

**Quantum Field Theory  
study group**

To help assist the IAP in its core work in regrouping modern physics, a new quantum field theory study group consisting of **Dr. Kenneth Klenk** (IAP Certified Member), **Dr. Stephen Strickland** (IAP Certified Member), **Anthony Coniglio** (IAP Associate Member), and **Benjamin Luna** (IAP Associate Member) has been formed. The group started in Fall 2022 and is using the Quantum Field Theory lectures given by **Dr. Antony Valentini** at **Clemson University** and which are available on the IAP YouTube page. See link at: <https://www.iapweb.org/resources.htm> The goal of the group is to help IAP members learn



as much high-level empiriometric physics as possible in order to become a better part of the IAP research team.

*Reported by Benjamin Luna,  
IAP Associate Member*

**\$20,000 goal for 2023  
Matching Donations**

Your donations between  
March 3 – 11, 2023  
will be matched dollar for dollar!

**Please help us meet our goal!**

You can donate online at  
<https://www.iapweb.org/store/#donate>

or by check:

Institute for Advanced Physics  
PO Box 15030  
Baton Rouge, LA 70895

*IAP is a 501(c)3 nonprofit organization*

# Dr. Rizzi on EWTN Live: “What is America?”

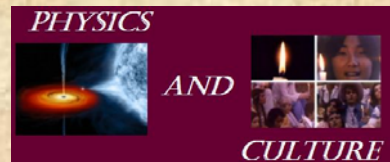
by Anthony DiCarlo, Membership Director



On October 26<sup>th</sup>, Dr. Rizzi and Fr. Mitch Pacwa, host of *EWTN Live*, discussed “What is America?”. Dr. Rizzi explained the true nature of America, debunking many often repeated claims such as that America is a young country and that the founders were deists. He highlighted how deeply America’s founders were steeped in the understanding of natural law, which they inherited from Catholic culture of Europe. He also explained how the scientism, the equation-only physics of modern culture, is destroying our understanding of nature and robbing America of its true national identity. And, only re-establishing the fully grounded physics (which IAP alone is doing) can fundamentally change our wrong direction. The episode is chock full of interesting and important truths about America, as well as information about what we can do to reclaim and defend the core nature of our nation! You can watch the episode [here](#).

Many people wrote or voiced how this show profoundly affected them and how truly grateful they were for it. Many, through seeing that it is critical for our country, began to see how critical proper physics is for everything good in our lives. In addition to the EWTN Live show, be sure to check out the article *What is America?* available in *Physics and Culture* magazine to learn more about America’s founding principles and their dependence on the foundational physics.

We invite you to read Dr. Rizzi’s articles in IAP’s online magazine



including the articles discussed in this issue of The Institute News. Articles include

### ***Love and Friendship***

#### ***What is America?***

*Two Types of Empirical People*

*Is Temperature Real?*

*What is Science?*

*Death of Justice?*

*Physics and "Judge not that you might not be Judged"*

*Is there in Truth, Beauty?*

*Is Your Computer Real?*

### ***How to have Productive, Enjoyable Conversations***

*Historic Discovery: Gravity Waves!*

View “gravity wave effect on man” animation

Read articles at:

[www.iapweb.org/iapmagazine.htm](http://www.iapweb.org/iapmagazine.htm)

In order to continue our important research and education outreach, we need your help. **Please support our work with a \$2 donation for each article you read** in our online magazines *Physics and Culture* and *Journal of Physics and Math*. Here is the link to donate: [Donate](#)

Dig deeper studying with Dr. Rizzi  
*What is America?*

IAP’s “**Conversations to Understand Our World**, interviews with Dr. Anthony Rizzi,” (CUW)  
April 15, 2021 [iapweb.org/podcasts](http://iapweb.org/podcasts).

**Michael Knowles** of the Daily Wire! interviews Dr. Rizzi on March 24, 2021. Watch at <https://youtu.be/NTMq6NeBvZg>.



## IAP welcomes new Associate Members Blatchford, Hogan, Izard, Robson, and Scheuer



**Kevin Michael Blatchford** is a Tennessee native, a Catholic, and a scientist. As the fifth of ten children born to Tim and Virginia Blatchford, Kevin grew up implicitly saturated in an important principle. This principle was to try to have good and true reasons for all that you say and do. This led to a great curiosity for exploration, understanding, and the natural sciences. This curiosity developed into a passion. After graduating high-school, Kevin began to pursue a B.S. in chemistry at **Tennessee Technological University**, which he completed in 2016. In further pursuit of greater understanding within his field, Kevin began studies toward a PhD in inorganic chemistry at the **University of Tennessee**. Currently in his 6<sup>th</sup> year, Kevin's research focuses on the development, synthesis, and basic understanding of chiral N-heterocyclic carbene macrocycles bound to first row transition metals and their aptitude for a variety of catalytic transformations.

Throughout high school, college, and graduate school, Kevin came face to face with great confusion and "scientific" thinking detached from reality. These ideas -- and the equations that "supported" them -- purported to shake the world apart and dubbed all religion unreasonable and at odds with the "truth." With great instructors through the Institute for Advanced Physics, Kevin has come to rest in reality and truth, both as a Catholic and as a scientist, complete and unified. Kevin became an Associate Member of the IAP in November of 2022. Kevin currently lives in Knoxville, TN with his wife Abigail and his two children Bernadette and Francis.

*"Encountering the IAP has been an incredible gift for me and my family. It has reintroduced the world to me and made it clearer than ever. Because of Dr. Rizzi and the IAP, I am grounded in truth and reality; I have a renewed passion to explore our world; I learn and think better; I am free of the chaos of living only in my mind; I am closer to and have a better understanding of my Creator and a stronger faith in Him; I am happier, and my family is happier. The IAP has changed my life, and I am excited to aid in its work and mission!"*



**Charlie Hogan, M.D.**, graduated from the **University of Texas at Austin** with a Bachelor of Science degree in biochemistry before entering medical school at **Texas Tech University Health Sciences Center**, where he was inducted into Alpha Omega Alpha and the Gold Humanism Honor Society. He completed a residency in orthopaedic surgery at **The University of Oklahoma Health Science Center** and a subsequent spine surgery fellowship in the **Texas Medical Center in Houston**, TX. He currently practices in Oklahoma City, OK where he lives with his wife Brittany and their three children.

Charlie and Brittany met Associate Humanities Member **John Paul Ochoa** and his wife April at their parish and through this friendship, they were introduced to the work of Dr. Rizzi and the IAP. They enjoyed meals

together along with edifying conversations about Truth and principle-based thinking. Shortly thereafter, Charlie enjoyed going through the IAP's associate member course with IAP Assistant Professor of Practice **Fletcher Williams**.

Charlie and Brittany enjoy spending time outdoors on the hiking trail or on the lake with their children and have enjoyed pilgrimages to the (relatively) nearby Benedictine Monastery in NE Oklahoma. They enjoy teaching their children, spending time with friends and family, and active participation at their parish.

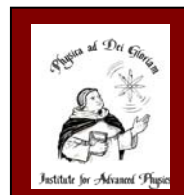
*"I enjoyed the IAP associate member course ... My wife and I now enjoy teaching our kids about substances and properties [core first physics]. The course showed me (amongst many other things) how empiriologically we moderns think, and how much reality this leaves behind! Kudos to Dr. Rizzi and the IAP."*



**Casey Izard** graduated from **Clemson University** in 2016 with a BS degree in Mechanical Engineering. After his graduation, he began working as a project engineer for **Techtronic Industries** in Anderson, South Carolina. There, he designed consumer and professional labor-saving devices under the Ryobi, RIDGID, and Hart brands. As his career developed, Casey pursued a Masters Degree from **Anderson University** in Organizational Leadership and took on a more managerial role at Techtronic Industries, overseeing a team of project engineers. He will graduate with his Masters Degree in December of 2022 with a concentration in human resource management.

Casey was first introduced to Institute for Advanced Physics (IAP) materials in 2016 by then college-friend, and later IAP Assistant Professor of Practice, **Fletcher Williams**. Casey joined a *Science Before Science* study group under the direction of IAP Membership Director **Anthony DiCarlo**, and upon completion was invited to participate in the IAP Associate Membership course, successfully achieving membership in November 2022. Casey seeks to incorporate the IAP's core principles into his everyday life and especially in the lives of his children, family, and co-workers. Casey is particularly thankful to the IAP for creating a community of truth-seekers and -knowers who make the basic principles of truth comprehensible, and thus livable. Casey and his wife, Anna, will soon celebrate six years of marriage in January, and have been honored by the opportunity to love four beautiful children, Fulton, Francis, Michael Maria (deceased), and Baby #4 due in July-2023. They are both deeply appreciative to the IAP and its works, which have helped shape them both as individuals, a couple, and parents.

*"The Institute for Advanced Physics has helped me reprioritize my life, bringing it to more-proper order. The world is in fact orderly, understandable, and real despite the pounding efforts of our culture communicating the opposite. It feels oh-so-good to live and thrive in the real world! The IAP has equipped me with the tools, resources, and community needed to begin and continue the laborious task of bringing myself, my family, and fellow man back to reality."*



Join forces with IAP.  
Become a member  
of the  
Institute for  
Advanced Physics.

Membership information is available at  
[www.iapweb.org/membership.htm](http://www.iapweb.org/membership.htm)



**Ethan Robson** is currently a senior majoring in chemical engineering with a physics minor at the **University of Tennessee, Knoxville**. He first learned about the Institute for Advanced Physics through his high school calculus teacher: IAP Assistant Professor of Practice **Fletcher Williams**. Mr. Williams had Ethan read articles such as *How to Learn in Four Steps* and *The Primary end of Marriage*, and go through the book *The Science Before Science* in the summer of 2019. After this, Ethan began his college education and got to virtually join another study group led by IAP Membership Director **Anthony DiCarlo** to go through *The Science Before Science* again. Mr. Williams, and after him Mr. DiCarlo, provided Ethan with much needed guidance at a pivotal time in his life and directed him towards the goodness of the IAP community and its content. It was in this study group with Mr. DiCarlo that Ethan met his now fiancé **Kateri Rizzi**, who he is extremely grateful for and has always been a good friend to him. She has intellectually supported him in every step of his journey learning IAP material, doing IAP projects, and overall living a fuller life.

After attending these two study groups, Ethan received the honor of getting to work on multiple IAP projects including ushering for the IAP Zoom Masses, assisting Mr. DiCarlo with his IAP study group for MIT students, and more. Ethan currently leads the Faith, Science, and Reason study group mentored by Associate Member **Giuseppe Rizzi** and aided by Volunteer Member **Michael Rutland** and Associate Member **Benjamin Luna**. Ethan has forged strong friendships with all of these gentlemen while running the group and doing other projects with them too. Ethan is also involved in the Biology Group, where most recently he and Kateri presented on how scientism manifests itself in nursing and how these manifestations stem from issues in modern biology. Ethan is most of all grateful to **Dr. Anthony Rizzi** because all of these previously mentioned things would not be possible without him. Furthermore, for his guidance and teaching throughout all of these projects and discussions that have come out of them. The knowledge gained from all these experiences with Dr. Rizzi is invaluable and has drastically improved Ethan's pursuit of the truth and ability to live it. Thanks to Dr. Rizzi, Fletcher Williams and IAP generally, Ethan, having started as an atheist before IAP, now *knows* God exists and is growing in truth everyday towards Truth Himself.

*"I now can see the profound meaning of my life with the eyes the IAP has given me. Life without IAP seems to me to be like living without senses, if you have help you can still barely manage to eat and breathe but you're hopeless to understand any of it. I want very much to share this with the whole world, so everyone can share in these profound truths that were given to me by the very intelligent and generous men of the IAP."*



**James Scheuer, Capt. USSF**, 26 years old, was born in Atlanta, Georgia. He obtained his undergraduate in Chemistry at **Clemson University**, where he commissioned into the **U.S. Air Force** as a Space Operations Officer in 2018. At the start-up of the **U.S. Space Force**, he transferred his commission to the Space Force in 2020. James obtained his M. S. in Space Systems from **Florida Institute of Technology**.

James is currently serving as a Captain in U.S. Space Force Delta 9, an organization dedicated to the space power discipline of Orbital Warfare. The mission of Delta 9 is to prepare, present, and project assigned and

**The Institute for Advanced Physics**

P.O. Box 15030, Baton Rouge, LA 70895

attached forces for the purpose of conducting protect and defend operations and providing national decision authorities with response options to deter and, when necessary, defeat orbital threats. James currently serves by ensuring maximum combat readiness of Delta 9 by building, developing, and equipping space professionals with relevant and realistic training.

James has been in various Institute for Advance Physics (IAP) study groups since 2018, and became an Associate Member in 2022. James is very excited to join the IAP and help further the mission of the IAP.

*“Before getting involved with the Institute for Advanced Physics, I had been living a very confused and task-driven life. The IAP has helped me order my mind and life in a principled manner, while grounding my thinking in the physical world. Everyone needs to know the discoveries the IAP has made, and the truths they have restored. I am very thankful for all of the work the IAP has done in making these truths accessible to everyone in such a clear way.”*

## Coniglio leads women’s Science Before Science study group



A *Science Before Science* study group for the wives of several Institute for Advanced Physics members has been underway in the last several months. The online, semi-monthly meetings are being led by IAP Associate

Member **Anthony Coniglio** who is a PhD candidate at Columbia University specializing in Mathematical General Relativity. The women are all enthusiastic about learning the material that their husbands are using in their activities in support of the IAP and that also will be of great importance to them in raising their children and in other life pursuits. The study group is learning the fundamental truths that are found in the book *The Science Before Science: A Guide to Thinking in the 21<sup>st</sup> Century* and *A Kid’s Introduction to Physics (and Beyond)* both authored by Dr. Anthony Rizzi, the director of the IAP. Certified Member **Dr. Kenneth Klenk** and Associate Humanities Member **John Paul Ochoa** are assisting Mr. Coniglio in the course.

The participants are learning such vital topics as:

How people can do science while keeping and even expanding their common sense.

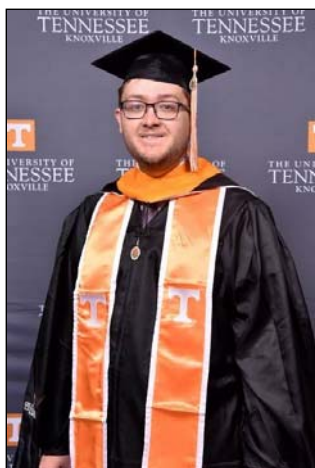
The nature of the broad physics and metaphysics that follows from it and how it radically changes the way we think and act in our ordinary lives.

How medieval science gained an understanding of basic physics before the equation based or empiriometric representation was developed.

Seeing how starting from the beginning allows one to understand modern day scientific problems such as forward and backward time travel, evolution, the big bang, relativity and quantum mechanics.

Learning to address the moral issues as presented by modern day science such as cloning, use of embryos for research, or genetically engineering of new animals and plants.

## The Magnetic Vector Potential: A Mere Mathematical Tool?



**Benjamin Luna**, PhD candidate at Clemson University and IAP Associate Member, presented his talk called *Not All Uniform B-Fields Are The Same!* at the **Clemson University graduate student mini-conference SIRPA 2022** on August 22nd and at the **American Physical Society's Southeastern**

**Section Fall 2022 conference** at the **University of Mississippi** on November 3-5<sup>th</sup>. He has been invited to present this talk at **Tennessee Technological University** in the spring. This work was completed under **Dr. Murray Daw**, Dean's Distinguished Professor of Physics at Clemson University and IAP Certified Member and Faculty, based on insights from the work of **Dr. Anthony Rizzi's** groundbreaking *Physics for Realists: Electricity and Magnetism*, which properly grounds the equations of electromagnetism in common sense.

The talk highlighted a universal misconception that begins in undergraduate

Electricity and Magnetism (E&M) which implicitly denies any physical nature to the magnetic vector potential (called the A-field) that is not captured in the magnetic B-field. Furthermore, it mostly ignores the A-field until graduate level courses. His talk goes through a problem in a famous undergraduate E&M textbook and demonstrates that because the problem assumes that all uniform B-fields are the same, the problem has several physically distinct solutions and cannot be solved as written. In quantum mechanics, the Aharonov-Bohm effect makes it hard to deny the physical reality of the A-field, but Luna presented a purely classical argument to show that the A-field does, in fact, capture a piece of physical reality which is not captured by the B-field. He did this by showing that not all uniform B-fields are the same, but depend on the source which produces them. Luna also pointed towards the reason why this misconception is so powerful, which is equation-alone physics. He urged his audience to return to looking at the physical things which the equations describe by reading Dr. Rizzi's *Physics for Realists* textbook series, which explains the insights of modern physics in a fully physical way for the first time.

### Learn how to have productive, enjoyable conversations

Dr. Anthony Rizzi teaches us 14 easy to learn steps in his article found in IAP's *Physics and Culture* (Volume 1) magazine

<https://www.iapweb.org/iapmagazine.htm>

### Common Sense Principles of Discussion

Effective and civil discussion is absolutely essential in reestablishing science on its firm foundation. Since discussion has in recent times become less and less clearly centered on its purpose – which is to get to the truth – we find we have developed bad habits of discussion. Indeed, it often happens that, despite our good intentions, discussions degenerate into incivility. It is Dr. Rizzi's hope that this article will help restore the right emphasis and civility in conversation.

## Coniglio Christmas Piano Concert



On the third Sunday of Advent, December 11, 2022, Associate Member **Anthony Coniglio** visited St. Joseph's Catholic Church in Anderson, SC by invitation of **Fr. Philip Gillespie**, St. Joseph's pastor, to give a Christmas piano recital entitled "Musical Reflections on the True Meaning of Christmas." At this recital, Coniglio began by thanking the Institute for Advanced Physics for the great gift of knowledge which enabled him to think about the true meaning of Christmas and the hymns he had planned to discuss and perform that night. Before each hymn he played on the piano, he gave a brief presentation on the history and meaning of the hymn and how the hymn reminds us of the reality that Christ became man to bring each of us to the truth. Each meditation Anthony provided gave everyone in attendance ample material to consider while listening to the beautiful music he played on the piano. Among the hymns he covered were *Hark! The Herald Angels Sing*, *O Holy Night*, *Away in a Manger*, *O Come All Ye Faithful*, and *O Come O Come, Emmanuel*. Finally, Anthony's performance was concluded by a meditation on *Joy to the World* with an invitation for everyone to join in and sing the hymn while he played it on the piano. Everyone then joined in giving him a standing ovation with vigorous applause. He closed by again expressing his deep gratitude to the Institute for Advanced Physics for all of

Fall 2022

the foundational truths he has learned which enabled him to put the event together for everyone. After this, many great conversations were had among friends, with everyone expressing his heartfelt joy and gratitude at having learned so much in preparation for Christmas!

Anthony has a Master's Degree in Mathematics from the University of Cambridge (England) and he is pursuing a Ph.D. in Mathematics at Columbia University, specializing in mathematical general relativity. In May 2019, he earned four bachelor degrees from Indiana University (Bloomington): three (3) Bachelor of Science Degrees (Physics, Mathematics, and Astronomy and Astrophysics), and one (1) Bachelor of Music Degree in Piano Performance.

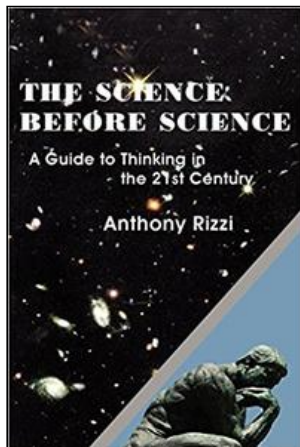
## Physics for Realists class for Clemson University professors and PhD students

Some physics professors, lecturers in the Physics & Astronomy Department, and PhD physics students at Clemson University, SC are meeting weekly for an in-depth study of Dr. Rizzi's *Physics for Realists* (PFR) textbook series. In the first year they completed PFR-Mechanics. The group is now studying PFR-Electricity & Magnetism. **Dr. Murray Daw** is teaching the class with assistance from Institute for Advanced Physics Certified Members **Dr. Rama Podila**, Assistant Professor of Physics at Clemson University, and **Dr. Ted Dickel**, Assistant Research Professor CAVS Solid Mechanics Working Group at Mississippi State University.



*Murray Daw is the Dean's Distinguished Professor of Physics at Clemson University. He is an IAP Certified Member and in 2006 he was appointed IAP Adjunct Faculty.*

## Strong and Successful Semester for the *Science Before Science* College Study Group



During the fall 2022 semester, the **college student study group** started up again, meeting every week to discuss the first half (Chapters 1-5) of *The Science before Science* by Dr. Anthony Rizzi. The group, led by IAP Associate Member **Giuseppe Rizzi** and IAP

Volunteer Member **Ethan Robson**, joins in together on Zoom each week from different Universities from around the country. The discussions were lively, with great questions being asked and profound answers being given. Everyone came to the meetings with thoughtful care and preparation. Throughout the semester, there was a great spirit of joy and enthusiasm in each conversation. One could see the importance of belonging to good community that cares about learning, as well as the necessity of finding good authorities to learn from. Because of this great care for learning in the group, a lot of time was taken to explain nuances and make distinctions so a proper understanding of the topics discussed could be reached. Contrasted with the usual way philosophy groups are done today, the group was very rigorous, and did not allow the usual sort of vague, feeling-oriented subjectivism to rule discussion. This truth-centeredness created an environment in which real respect for the intellect of each one present was upheld. The leaders of the group were so enthusiastic to help others learn the truths that they have learned, and the real insights and reasoning of those participating was always lauded. The

group was a big success as it inspired university students to seek and live in the truth, perhaps for the first time in life. One group participant, **Isaac Vaughn** said at the last meeting of the semester:

*I can touch reality now...I want to reaffirm this mission. It has been so powerful; you can get back in touch with reality and it is so exciting to share with people. ... it brings me a lot of joy to confidently talk about what I can sense with others.*

The group will pause over Christmas break, meeting for a games night and a discussion group on the *What is America?* article written by Dr. Anthony Rizzi. The group will resume shortly after the beginning of the spring semester for more learning, laughs, and good times!



Reported by  
Christian Captain, Clemson  
University physics major and  
study group participant

*The Science Before Science: A Guide to Thinking in the 21<sup>st</sup> Century* by Dr. Anthony Rizzi is available in paperback on Amazon and [audio](#) on the IAP website

### Find the answer to these questions and more:

**W**hat is the key to the truth and power of science?  
**W**ould a theory of everything disprove the soul?  
**I**s matter all there is? **C**an I keep science and my common sense? **I**s it evolution or creation...**a**re they mutually exclusive? **W**ill scientists ever make a man? **H**ow does one decide issues like human cloning objectively? **W**ill we ever create artificial intelligence...if so, **w**hat does that say about my worth? **W**hat is the ultimate source of our intellectual malaise?

# Love and Friendship: What is Love? What is a Friend?

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 "Love and Friendship".*

Love, and, following on it, friendship, are universally seen as core realities. And, they are indeed. But, what are they? How should we live them? Alarming as it is, because of the deep loss of the primary understanding of the physical world arising from our equation-alone physics at the core of our culture (what we'll call scientism), we don't truly know! Because of the loss of our understanding of the physical world, we do not truly realize the fact that *everything we know comes through what we know through the senses.*<sup>1</sup>

And, in our culture, the definition of love, though love is recognized by most as primal, has neither been even fully and properly given let alone understood. Indeed, current thinking and belief is not only deeply confused but wrong in deep ways because of the equation-first thinking at the core of our culture.<sup>2</sup> As if this weren't bad enough, we have 400 years of knowledge of the physical world provided by the physical sciences of physics, chemistry, and biology which has been

<sup>1</sup> See "The Science Before Science: Reintegration of the Modern Mind and its Science", A. Rizzi, October 2006 plenary talk at the American Maritain Conference, Published: *Reading the Cosmos: Nature, Science, and Wisdom*, American Maritain Association Publication (2011), also in Vol. 1 *Physics and Culture* and (SBS) *The Science Before Science: A Guide to Thinking in the 21<sup>st</sup> Century*, A. Rizzi (IAP Press, 2004).

<sup>2</sup> See references in (fn 1) as well as A. Rizzi, "What is Science?", "A Brief History of Nothing", and "What is the One Ring that Rules them all?", *Physics and Culture* (Feb 2019, Jan 2014 and Nov 2019).

incorporated in our modern culture in an empiriological<sup>3</sup> way, characteristic of modern science. Because this new knowledge is a profound and deep specification of previous generic understanding, to live properly in such a more advanced culture, we *need* a much more profound understanding of love and friendship than past ages, but, instead, because of the equation-alone physics at the base of our culture, we have a much worse one and increasingly so.

Copyright May 2022 by Anthony Rizzi, all rights reserved.

[Click here to read more](http://www.iapweb.org) 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](http://iapweb.org/iapmagazine.htm)



**Anthony Rizzi, Ph.D.,** founder and Director of The Institute for Advanced Physics (a 19-year-old non-profit organization), 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. LIGO won the Nobel Prize in physics 2017. In addition to professional publications, he is author of the Physics for Realists textbook series, The Science Before Science, and A Kid's Introduction to Physics (and Beyond) Vols. I & II.

<sup>3</sup> The *empiriological method* is that method that looks at the world through the property of quantity using a system of symbols and rules (equations in physics) to make predictions about the world. The heart of the empiriological method is the *empiriometric method*, which, as noted, uses equations.