

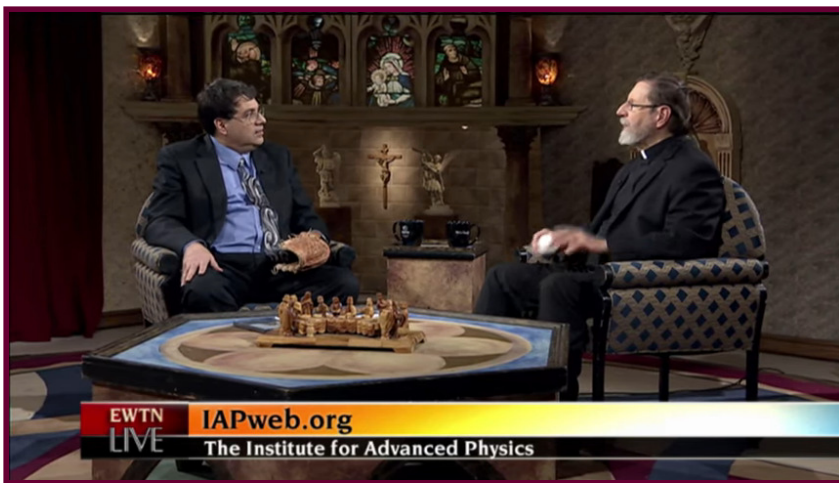


## THE INSTITUTE FOR ADVANCED PHYSICS

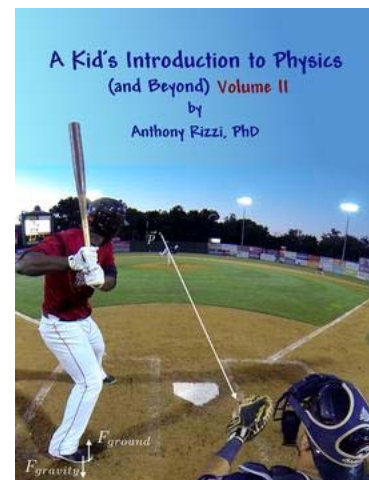
# The Institute News

- Television introduction of *A Kid's Introduction to Physics (and Beyond) Vol. 2*
- QM research published in *Foundations of Physics*
- Massachusetts Institute of Technology talks; MIT students join SBS group
- New Certified Members: Dr. Dias and Dr. Podila
- New Associate Members: Coniglio, Lane, and Giuseppe Rizzi
- New Associate Humanities Members: Beaumont, D'Amato, and Ochoa
- Physically grounded sermons
- *Four Steps for the Family* handbook
- *The Case for Truth: An IAP TV series*
- *Is Temperature Real? or is it just moving bodies?* by Anthony Rizzi

## Television introduction of Kid's Intro to Physics Vol. 2



Reason comes before Faith, and the loss of reason has led to our drastic loss of the Faith. Physicist and Thomist Dr. Anthony Rizzi discusses with Fr. Pacwa on EWTN Live on Jan. 29<sup>th</sup>, 7pm CT how everything, including Catholicism, starts with physics and how our deep problems stem from a neglect of physics! All discussed in the context of his new fundamental book *A Kid's Introduction to Physics (and Beyond) Vol. II*. The book uses baseball to teach the concepts. *Continued on next page.....*



*Continued from page 1.....*

Dr. Anthony Rizzi, Director of the Institute for Advanced Physics, and Fr. Mitch Pacwa, host of EWTN Live, had a lively discussion using baseball to demonstrate some of the concepts in Volume II. The book is a sequel to *A Kid's Introduction to Physics (and Beyond)* that continues on the lessons learned showing the simple connection between physics, our everyday world, and God. These two volumes, targeted to seventh and eighth graders, are an *essential* supplement to your student's or child's science curriculum for 6<sup>th</sup> grade and up. Indeed, the concepts, once learned, can and should be taught to even younger children. The books show how science, when rightly understood, inevitably leads to God, and how everything we learn about the physical world tells us something about God. They answer the oft heard questions "Why do I need to learn physics?" and "Why do I need to learn math?" in a direct and charming way.

They discuss why parents should introduce kids to physics. The first thing we know is the physical world (not ourselves or God). We first need to *know*

what the things we can see (physical things) are before we can know or talk about God whom we cannot see.

Volume II goes beyond what was learned in the first volume introducing more modern physics at a simple level. It can be simple (indeed understandable to a young child) *only* because it, like no other books, starts with the foundation of what we actually know through our senses.

Dr. Rizzi explained people today (including many college students) call into question whether we can even know the world exists! In fact, due to quantum mechanics, many think the world is not there until you measure it. He discusses how one interpretation of quantum mechanics thinks each of us split into an infinite number of persons at every event! He tells a story of how one girl lost her peace in worrying about the ramifications of this. We need the fundamental principles in this book to address our intellectual sickness.

***How do I purchase the book?***

The book (6x8, 107 pages, 14 font, soft cover) may be purchased for \$28 plus s/h on the IAP web site at:

<http://www.iapweb.org/store/kids.html>

## **PFR quantum mechanics research published in *Foundations of Physics***

On February 14, 2020, Dr. Rizzi published *How the Natural Interpretation of Quantum Mechanics Avoids the Recent No-go Theorem* in *Foundations of Physics* volume 50, pages 204–215 (2020).

<https://link.springer.com/article/10.1007/s10701-020-00323-x>

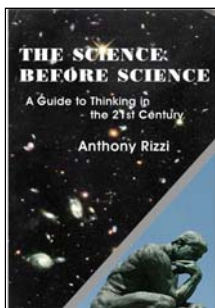
**Abstract:** A recent no-go theorem gives an extension of the Wigner's Friend argument that purports to prove the "Quantum theory cannot consistently describe the use of itself." The argument is complex and thought provoking, but fails in a straightforward way if one treats QM as a statistical theory in the most fundamental sense, i.e. if one applies the so-called ensemble interpretation. This explanation is given here at an undergraduate level, which can be edifying for experts and students alike. A recent paper has already shown that the no-go theorem is incorrect with regard to the de Broglie Bohm theory and misguided in some of its general claims. This paper's contribution is three fold. It shows how the extended Wigner's Friend argument fails in the ensemble interpretation. It also makes more evident how natural a consistent statistical treatment of the wave function is. In this way, the refutation of the argument is useful for bringing out the core statistical nature of QM. It, in addition, manifests the unnecessary complications and problems introduced by the collapse mechanism that is part of the Copenhagen interpretation. The paper uses the straightforwardness of the ensemble interpretation to make the no-go argument and its refutation more accessible.

Dr. Rizzi acknowledges Certified Member **Dr. Doyl Dickel** for very helpful conversations during the writing of this article and for his insight-generating comments on the completed article.



## Massachusetts Institute of Technology Talks MIT student SBS group started

**Dr. Anthony Rizzi** was invited to give a series of talks at the **Massachusetts Institute of Technology** (MIT). The MIT **Tech Catholic Community** (TCC) invited him as a “Catherine McLaughlin Hakim” Lecturer. The talks were scheduled for April 3, 2020 at MIT. However, due to the COVID-19 pandemic, the event was postponed. In the interim, Dr. Rizzi appeared via Skype giving a talk to MIT faculty and students entitled *The Science Before Science: Calling Science Back to its Full Nobility*. Dr. Rizzi addressed the fundamental problems that exist in modern science and their effect on the larger culture and the urgent need for the work of the Institute for Advanced Physics (IAP). The talk was orchestrated with the help of **Fr. Daniel Moloney**, MIT chaplain.



After the talk, a group of MIT students wanted to learn more and responded by joining an study group based on *The Science Before Science* (SBS) and *A Kid's Introduction to Physics (and Beyond)* (KIP), both by Dr.

Rizzi. The group is lead by IAP Associate Member **Anthony DiCarlo** with Associate Member **Frank Camacho** assisting. **Ethan Robson**, a rising sophomore at the **University of Tennessee** who has completed a SBS study group and is advanced in his understanding for his age, is also assisting with this group.

The study group started in early May 2020 and meets once every other week. Group members have expressed excitement and

gratitude for what they are learning through studying this essential material.

[Editor's note: There are SBS study groups meeting across the country. IAP encourages interested individuals to start one in their area.]



“Dr. Rizzi teaches people how to be human again. That is to say he teaches that people are made for the truth and so they need to live principled and thoughtful lives in order to conform to the truth as much as possible.”

**Ethan Robson** (class of 2023, studying chemical engineering at the University of Tennessee) fall 2019 SBS study group participant and spring 2020 MIT/fall 2020 LSU SBS study group assistant

### The Science Before Science: A Guide to Thinking in the 21<sup>st</sup> Century

by Anthony Rizzi

In this book, I uncover the foundations of science. Though the subjects will be familiar, the insights into them will be, for nearly all, completely new. As, Dr. Schneider, one of the reviewers of this book, said to me, "I used to believe the things you point to in your book, but now, after reading your book, I know them and no one can take them from me." Another such reviewer said, "it seems I should have known all this, because they are things I've encountered all my life but I did not really know any of it."

Order your copy of the book at

[www.authorhouse.com/BookStore/BookDetails/243650-The-Science-Before-Science](http://www.authorhouse.com/BookStore/BookDetails/243650-The-Science-Before-Science)

## Dias and Podila New Certified Members



**Gonçalo Dias** was born in Lisbon, Portugal. He grew up surrounded by Classical and Portuguese culture, for which he has a particular fondness. However, contemplating the mysteries of the Universe

became a life interest, which has never been separated from his Catholic Faith – in fact because of it. He thought he should start from the ground up and so decided to study Physics.

He graduated from the **Instituto Superior Técnico (IST – Lisbon)** in Physical Engineering in 2002 and enrolled for Ph.D. in the Physics Department of IST in 2003. He studied Hamiltonian methods in the context of black hole thermodynamics (Ph.D. 2008). He had a particular interest for this subject, where he thought some profound questions of modern physics could find their solution. However, after 2010 he moved on to classical mathematical physics in the context of fluid mechanics. Here too some very deep questions can be addressed and some links to gravity can be made. This is an ongoing task. He is now a Researcher in Mathematical Physics, Mathematics Department, IST-Lisbon.

An avid reader, with a special interest in History in all of its aspects, he has tried to compensate for his lack of preparation in the Western Classical Tradition by studying on his own or with the help of his parents.

Dias says of his studies at the Institute for Advanced Physics, *"I have learned to begin the integration of the 'old knowledge' of the first principles to the new technical knowledge of the natural world."* IAP is the only place that retains the "old knowledge" because it is only

fully accessible to us moderns after properly understanding our modern physics. Dias looks forward to continuing his studies and advancing the work of IAP as a Certified Member.



**Rama Podila** obtained his MS in Physics from the **Indian Institute of Technology (IIT) Roorkee** in 2007. Later, he graduated with a PhD in Physics from **Clemson University** in 2011. His thesis was focused on

understanding defects in low-dimensional materials using optical spectroscopy. He worked as a post-doctoral fellow at the **Brody School of Medicine** (Greenville, NC) to study biological applications of nanomaterials. He is presently an assistant professor of physics at Clemson. The research interests of his lab are at the interface of physics, biology, and nanoscience. Dr. Podila's lab aims to seamlessly integrate the principles of condensed matter physics, optical spectroscopy, and physiological chemistry to understand physics at the nanoscale and nano-bio interfaces. His work thus far has led to >70 peer-reviewed articles (Citations: 4345; H-index: 39) in high-impact journals including Nature, Advanced Materials, Advanced Functional Materials, Journal of American Chemical Society, Nano Letters, 3 patents, and several invited talks. Presently, his group's research is supported through funding from NIH/NIEHS, NASA, and NSF. He is very excited about the new world opened to him by IAP and the opportunity to grow into it.

## New Associate Members: Coniglio, Lane, and G. Rizzi



**Anthony Coniglio**, 23 years old, will graduate with a Master's Degree in Mathematics from the **University of Cambridge** (England) in July 2020, and in Fall 2020 he will pursue a Ph.D. in Mathematics at **Columbia University**, where he plans on specializing in mathematical general relativity.

Prior to attending Cambridge, Anthony attended **Indiana University** (Bloomington, Indiana), graduating in May 2019 with four bachelor degrees: three (3) Bachelor of Science Degrees (Physics, Mathematics, and Astronomy and Astrophysics), and one (1) Bachelor of Music Degree in Piano Performance. While he was an undergraduate, he engaged in research projects at **Cornell**

**University** and at **Valparaiso University**, resulting in original research published in the mathematical journals *Communications on Pure and Applied Analysis*, and *The American Mathematical Monthly*, respectively. Anthony has taken part in mathematical summer programs at Princeton University, Northwestern University, Park City Mathematics Institute, and the Statistical and Applied Mathematical Sciences Institute.

Anthony is excited to be an IAP Associate Member as of June 2020 and looks forward to continuing his involvement with the IAP. Anthony first learned of the work of Dr. Rizzi and the IAP through Fr. Mitch Pacwa, S.J., of EWTN.

*"I am very grateful for the work of the IAP. I thank God for the wisdom I have gained from its members. The IAP has helped equip me with the knowledge I need in order to help counteract the moral decay so prevalent in today's culture. I have grown tremendously in my understanding of physics, philosophy, and God. The IAP has truly changed my life and the way I look at the world."*

Anthony Coniglio



**Brian Lane** studied philosophy and physics at the **University of California San Diego**, and he received a B.A. degree (Philosophy) from **Gonzaga University** in 1994. He then studied virology and immunology at the **University of South Florida College of Medicine**, receiving an M.S. (Medical Science) in 1998. Mr. Lane's graduate research was focused on replication of Kaposi's sarcoma-associated herpes virus/Human herpesvirus 8 in human lymphocytes. He then studied the expression and distribution of cannabinoid receptors 1 and 2 in human immune cell populations to increase understanding of the immunomodulatory affect of drugs of abuse. *Continued next page*

Mr. Lane served as the acting Director of a **Florida State Animal Disease Diagnostic Laboratory**, and he later served as a manager with the **Florida State Food Laboratory** where his responsibilities included developing quality systems, managing a biosafety level 3+ laboratory, and coordinating development and validation of rapid methods for the detection of bioterrorist agents such as *bacillus anthracis*, ricin, and botulinum toxin.

Mr. Lane served for 10 years as a contractor and federal employee with various programs at the **U.S. Centers for Disease Control and Prevention (CDC)** in Atlanta, GA, and he now works as an independent consultant living in Oakwood, GA.

*When I learned of Dr. Rizzi and The Science Before Science in 2017, my reaction was, "I have been searching for this for 30 years!" I cannot overstate the impact the Institute for Advanced Physics has had on my life. As someone who has lived so long "in his head," I thank God that Dr. Rizzi brought me back to the real world!* Brian Lane



**Giuseppe Rizzi** is an Electrical Engineer from **Texas A&M University** in College Station, TX. After graduating in May 2020 Summa Cum Laude, he joined **Texas Instruments** in Dallas, TX as a Digital Design Engineer. His undergraduate research thesis was harvesting ultra-low power wireless signals. The project focused on powering and charging devices using WiFi up to 20 meters from a standard household WiFi router. The research won 2nd place in the US and Canada at the 2019-2020 IEEE CASS Student Design Contest.

Giuseppe also has a minor in Computer Science and a software background. In 2019, he was awarded top achieving junior at the annual Texas A&M programming contest. He qualified to represent the university in the regional ICPC programming

contests in 2017 and 2018, competing against other universities. The contest tests data structure and algorithmic skills. While in school, he worked as a software engineer for the Engineering Honors program at Texas A&M.

For many years, he has been volunteering to create and support software for IAP. In 2017, he redesigned the IAP online store. In 2018, he updated our website with a new look and updated features including mobile compatibility. Recently, he built a fun game which can be used to practice IAP vocabulary (available with a \$5 donation at

<https://iapweb.org/store#grab-word>).

*IAP has made a profound impact on my life. From anchoring a firm grounding in the physical world and the sciences to giving me a rational understanding of my faith, IAP has enabled me to avoid many of the infamous pitfalls so common to college students and everyone in modern culture. I am proud to be a new associate member, involved in a noble cause working alongside some of the most wonderful people that you will ever meet in a deeply caring and unified community that is impossible to find anywhere else!*

Giuseppe Rizzi

## Three New Associate Humanities Members

IAP created an Associate Humanities Membership level in response to requests to join IAP from individuals who do not have a science background. These candidates complete a rigorous 12-month study course of *The Science Before Science* and are committed to participating in IAP projects, as well as involvement in on-going education at IAP. We are pleased to welcome our first members on board!

### Stephen Beaumont



Stephen Beaumont (left) with Pope John Paul II

**Stephen Beaumont** is the Director of Studio Operations for **EWTN** in Birmingham. He has an MFA in Motion Picture, Television and Recording Arts from **Florida State University**, and a BA in Communication from the **University of Tampa**.

During his 22 years at EWTN, Stephen has been involved in many productions, but is most proud of his work as producer of *G.K. Chesterton: Apostle of Common Sense* with Dale Ahlquist, and *The Science Before Science* with Dr. Anthony Rizzi.

Stephen's current responsibilities at EWTN include: supervising producers, editors and production crew; coordinating special events; coordinating technical aspects of productions between departments; and occasionally producing a series. He is currently working on a 5 part series with Dr. Rizzi entitled, *The Case for Truth*.

Stephen is also a musician, specializing in the 5 string banjo and dabbling in mandolin, guitar and upright bass. He

recently started a YouTube channel featuring banjo instruction videos and short performance pieces.

Stephen lives in Birmingham, AL with his wife and 3 children.

Stephen has said many times how life changing his involvement with IAP has been for him. He looks forward to being a part of IAP's work.

### Brendan D'Amato



**Brendan D'Amato** attended **Clemson University** in South Carolina where he earned a dual degree in Financial Management and Accounting. He then went to **Wake Forest University** in North Carolina for his master's in Accountancy. After graduating, he joined a manufacturing company headquartered in Charlotte, North Carolina, working in their corporate finance group. He spent six months at the headquarters, six months at a manufacturing site in Houston, Texas, and then returned to the Charlotte office. After spending eighteen months in corporate America, Brendan recently left and will be joining the **FSSP** (The Priestly Fraternity

of Saint Peter) seminary this fall.

Brendan reflects on his participation in the Associate Membership program stating, *“Reading and discussing The Science Before Science has greatly impacted my life. It has deepened my appreciation for the magnificence of existence and has increased my interest in understanding the physical world. The book explores and elucidates both the simplicity and the intricacy of reality. It has humbled me as I come to better understand my own human nature and more clearly glimpse the greatness of God. Dr. Rizzi’s continued encouragement to practice principled thinking has equipped me to be a better man and a more devout Catholic.”*

## John Paul Ochoa



John Paul and wife April

**John Paul Ochoa** graduated from **California State University**, Sacramento in 2014, graduating with a Bachelor of Arts in English and a minor in philosophy. Afterwards, John Paul studied at the **Dominican School of Philosophy and Theology**, an affiliate of **University of California, Berkeley**, and received the Holy Rosary Scholarship before graduating in 2016 with a Master of Arts in

Theology. There, he studied the systematic, scholastic tradition of Saint Thomas Aquinas with Dominicans and lay people alike. John Paul then attended the **University of Notre Dame** in 2018, graduating with a Master of Education through the Alliance for Catholic Education (ACE) Teaching Fellows program, specializing as an Elementary Generalist.

During his time at the University of Notre Dame, John Paul began studying the IAP’s materials through study groups of *The Science Before Science* led by physics and math teacher, **Fletcher Williams**. John Paul was then invited to apply to the Associate Humanities Member course with successful completion in May of 2020. John Paul strives to infuse the IAP’s core physics principles into his teaching, especially those found in *A Kid’s Introduction to Physics*, *Physics for First Holy Communion*, and *The Science Before Science*. He looks forward to studying these principles further through the IAP’s groundbreaking series, *Physics for Realists*.

John Paul currently specializes in teaching elementary students the core principles of the IAP, which are invaluable for having the proper, physics-based understanding of reality. He is particularly indebted to **Saint Thomas Aquinas** and **Dr. Anthony Rizzi** for their revolutionary works and systematic approach in articulating the truth. John Paul and his wife, **April**, are happily married and deeply thankful to the IAP for its essential foundation in truth. John Paul is now working on IAP social media outreach.

*Although by Revelation we are elevated to the knowledge of things that would otherwise remain unknown to us, yet we are never raised so far as to know them in any way other than through things that can be known by the senses.* **St. Thomas Aquinas**



# Physically Grounded Sermons

## for the Traditional Mass Liturgical Cycle



**Gerardo Vazquez**

Associate Member **Gerardo Vazquez's** thesis work has begun. Along with IAP members, he has been working on what will eventually become his thesis for his M.A. in Theology at **St. Patrick's Seminary** in Menlo Park, CA. The work is "Sermons for Realists: A Guide to Preaching in the 21<sup>st</sup> Century." The work is lead by **Dr. Anthony Rizzi**

with other collaborators being IAP members **Fr. Neal Nichols, FSSP, and Dr Ted Dickel** as well as the "leadership team" which consists of **Fletcher Williams, Anthony DiCarlo and Vasquez**; this team is tasked with, after given the principles by Dr. Rizzi, bringing the sermons to completion. The group has been meeting weekly since February 2020, and the Leadership team meets 2-3 times a week in preparation for the weekly Monday meetings. The core of this project is to integrate the physics and explain the teaching of the Church in a

grounded way, with special emphasis on the Scripture readings for each Sunday.

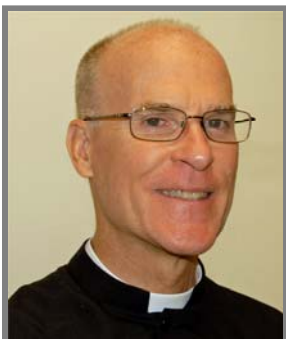
The IAP addresses a profound need that has been ignored for the past 400 years since the

scientific revolution. Our equation-only thinking has eroded our common sense and ability to think from obvious first principles more and more over this time, and the preamble of the faith has been all but lost. As grace builds on nature, so too does faith build on reason. We can only get to *metaphysics* and *theology* if we start from the *physics*. We need to reclaim the Preamble. These sermons will both call people back to the fundamental starting point of all our thinking and will give them a grounded understanding of the Catholic Faith and challenge them to integrate this new understanding in their lives.

Using their robust sermon development process, Gerardo and the team have completed four sermons starting from the 1<sup>st</sup> Sunday of Lent. Handouts to get IAP resources out to parishes have been generated as well as reading suggestions for priests to further their education so that they may better share what they learn with their flock with confidence. Working on these sermons has already made an impact on its contributing members in being able to articulate the reasons for their faith with great clarity. To top it off, Fr. Nichols was able to preach, with good success, on the 2<sup>nd</sup> Sunday of Lent using one of these sermons! The goal is to develop sermons through the entire liturgical cycle before May 2022, which is when Gerardo, God-willing, will be ordained a priest. Please keep him and this project in your prayers as this will help fill a void that has been ignored within the Church for far too long.



**Dr. Anthony Rizzi**



**Fr. Neal Nichols, FSSP**



**Anthony DiCarlo, Fletcher Williams**



**Dr. Ted Dickel**

## Four Steps for the Family handbook



Mrs. Deya Garcia (and baby), Mrs. Hannah Williams, and Mrs. Katie DiCarlo (and baby) left to right

On January 7<sup>th</sup>, **Mrs. Hannah Williams** (Tennessee), **Mrs. Katie DiCarlo** (South Carolina), and **Mrs. Deya Garcia** (Texas) met with **Dr. Anthony Rizzi**, IAP Director, via Skype to discuss the development of a handbook for the family. The handbook will be guided by the principles in Dr. Rizzi's article, *How to Learn in Four Steps*. In his article, Dr. Rizzi says, "The first two steps have to do with thinking itself, while the second two have to do with how to use the thinking. In short, there is a distinction between thought and practice. Both are necessary and both need to be in their proper place." Dr. Rizzi encourages everyone to read this article and apply these four steps in their lives.

Mrs. Williams explains that "The goal of the *Four Steps for the Family* handbook is to create a guide for families to get them a Step 1 understanding of marriage, the family, and proper roles of men and women, and help deepen it to Step 4. This handbook is addressing the urgent need for concrete advice about the basic things we need to have a healthy family life. It is about these things based in the first physics that IAP has uncovered and is teaching. Only by getting the first physics right and integrated into our daily lives can we live the

happy full lives of growth in Truth that God made us for. This will include seemingly small things like what toys to give your children and how to celebrate holidays but also dive deeper into things like what the proper roles for husbands, wives, and children are within the family."

Mrs. Williams, Mrs. DiCarlo, and Mrs. Garcia are the wives of IAP Associate Members. They attended a three day *Science Before Science* conference for IAP family members in July 2018. At that conference, Mrs. DiCarlo and Mrs. Williams presented a workshop on Dr. Rizzi's *A Kid's Introduction to Physics (and Beyond)*. These three wives and mothers encourage each other in applying the four steps in their home school and family activities and hope to support other women in this endeavor.

The four steps in learning how to do anything are:

- |          |   |  |
|----------|---|--|
| Truth    | } | 1. Find and understand the principles involved   |
|          |   | 2. Habituate that understanding (practice thinking about those principles until they become second nature) |
| Practice | } | 3. Think through how those principles can be applied in (your) life  |
|          |   | a. <i>What</i> can I use them for to advance in truth?   |
|          |   | b. <i>How</i> do I do these things?  |
|          |   | 4. Habituate those actions.  |

[Click here to read \*How to Learn in Four Steps\*](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 <http://www.iapweb.org/iapmagazine.htm>

## The Case for Truth: An IAP TV series

A significant project in January was the development of the content for *The Case for Truth* program by IAP Director **Dr. Anthony Rizzi** and Associate members **Anthony DiCarlo** and **Fletcher Williams**. After many meetings planning (in the fall of 2019) the content of the five episode series, the filming at EWTN Studios took place over the course of three days starting on January 29th. It was filmed under the direction of **Stephen Beaumont**, Director of Studio Operations. EWTN theologian **Noah Lett** hosts the program in

which he interviews Dr. Rizzi about the mission of the Institute for Advanced Physics. The program is currently being edited and the title may change. Air date will be announced soon.

The below illustrates what our world has come to in "Catholic" schools. An IAP candidate member's child recognized ***the irrationality of the following poem*** endorsed by the teacher during a class in Catholic school...

*"The whole business of what's reality and what isn't has never been solved and probably never will be. So I don't care to be too definite about anything. I have a lot of edges called Perhaps and almost nothing you can call Certainty."*

### IAP teachers and the IAP community Congratulate and Welcome on board our new members!

Our 2020 members completed a rigorous 12-month program consisting of lectures, written home work, and a written exam based on Dr. Rizzi's book *The Science Before Science: A Guide to Thinking in the 21<sup>st</sup> Century*. In the course, they learn the first physics and how to integrate it into their daily lives. IAP faculty and members teach and assist at these courses investing significant time in discussion on how to integrate the general principles into one's daily life.

Certified Member **Dr. Murray Daw** (Clemson University physics department) taught the Certified Member course with assistants Certified Members **Dr. Ken Klenk** (principal consultant Science Systems), **Dr. Ted Dickel** (Mississippi State University), and Associate Member **Fletcher Williams**.

**Fletcher Williams** (B.S. physics Clemson University, M.Ed. University of Notre Dame) taught the Associate Member course. Associate Member Level II **Kevin Hix, M.D.**, (internal medicine and nephrology specialist) and Associate Member **Ron Heisser** (Cornell University graduate engineering student) assisted. Due to overwhelming medical duties this past spring resulting from COVID-19, Dr. Hix had to leave the group in March.

**Ken Klenk, Ted Dickel, and Fletcher Williams** made recordings of all of the **Most Important Questions (MIQ) and answers** that were used in the most recent membership courses. They began this project in April 2019 and completed it over the course of this past year. These recordings are available online only to candidates taking membership courses.

Daw



Klenk



Dickel



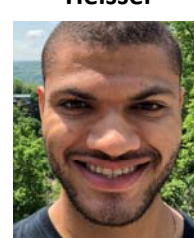
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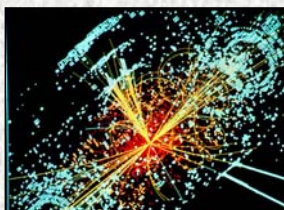
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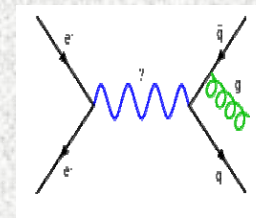
The Institute for Advanced Physics presents its 18<sup>th</sup> annual conference



# Quantum Field Theory

by invitation only  
in Baton Rouge (in extension via Zoom due to COVID-19)

July 22 – July 25, 2020



## Check out resources at IAP's online magazine

- What is the One Ring that Rules them all?*
- Is Temperature Real?*
- What is Science?*
- The World Just Got More Empirical Today*
- Death of Justice?*
- What is the Difference Between a Lab and a Border Collie?*
- Physics and "Judge not that you might not be Judged"*
- 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*
- How to Have Productive Enjoyable Conversations*
- Historic Discovery: Gravity Waves!*

View "gravity wave effect on man" animation

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*Thank you for your support!*

# Is Temperature Real? or is it just moving bodies?

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), IAP magazine and now IAP Journal of Physics and Math have been initiated.*

*In Physics and Culture articles (complete articles located on the IAP web site at the below link), Dr. Rizzi shows us how the basic physics teaches us the meaning of something that we probably think we already know, but actually don't!*

Temperature is a real *quality* of a body.<sup>1</sup> Temperature has been found to be associated with the motion of atoms and electrons. For those that have absorbed the modern scientific (empiriometric<sup>2</sup>) understanding of temperature as presented already in grade school books, temperature is just the random motion of the particles that make things up. It is *not*, however, reducible to the motion of those parts. Rejecting the reality of the things we directly sense, such as warmness or color, begins with at early stages of the development of the modern scientific method. For example, Galileo thought all the things we sense: “tastes, odors, colors and so on are no more than mere names...they reside only in the consciousness.”

**We feel warmness.** We feel the warm skin in a hand shake. We see that the warmness is a property of the man; it is one of his qualities

<sup>1</sup> To be precise, by body we mean a physical substance. Quality is the second property of physical things. To understand substance and quality, and all the generic principles we get through the senses and their place in our thinking and acting, see A. Rizzi, *A Kid's Introduction to Physics (and Beyond)* Volumes I (2012) and II (2019) (KIPI&II) and *The Science Before Science: A Guide to Thinking in the 21<sup>st</sup> Century*, Anthony Rizzi (2004) (SBS).

<sup>2</sup> The empiriometric method looks at the “empirical” world through the first property of physical things (quantity), using a system of rules and symbols like equations. See KIP and SBS referenced in footnote 2.

(subcategory of power)<sup>3</sup> to have a certain temperature. We first *know* warmness. It is generic and vague but we know it. We don't later un-know it! However, later, we do ask what that warmness means more specifically. After much investigation, we learn that more specifics of its nature are revealed by a kind of generic motion of the parts. In so doing, we see more specifically the dynamism we have already seen directly through our senses is an *effect* of the property of “warmness.” We see that warmness causes activity, such as boiling water, but only because we have first sensed warmness. Furthermore, we would not have even sought an energy (expressed in terms of speed) probability distribution<sup>4</sup> if we did not know first the quality of temperature that it seeks to further understand.

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<sup>3</sup> See KIP referenced in footnote 1.

<sup>4</sup> Empiriometrically, temperature,  $T$ , is defined as:  $1/T = \partial S / \partial E$ , where  $E$  is energy and  $S$  is entropy, the log of the number of possible states with  $E$ . Note we are not attempting to give an exhaustive treatment of temperature but just the next level of specification beyond what we get directly through the senses. In this way, we are undoing the false understanding (which arises from a wrong understanding of empiriometric physics) that makes us take “warmth” as being a feature of our minds, rather than a property of the body itself. This, thereby, subjectivizes our sense knowledge, breaking its contact with the physical world. And, since all we know comes through what we know through the senses, it subjectivizes all of our knowledge, including that of modern science.

*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. LIGO won the 2017 Nobel Prize in Physics.*