Fall, 2024

Issue 57

Long Island Physics Teachers Association Newsletter

President's Message

Teaching physics is a great career—or as I like to say, it's a pretty good gig. If you're lucky, you'll find yourself at a school where you'll stay for years, forming relationships with students and colleagues. So, it's worth making sure you enjoy what you do!

One of the best parts of teaching physics is how much fun we get to have in the classroom. Whether it's playing with toys to explain physical concepts, designing and testing projectile devices (anyone else host a pumpkin chuckin' contest around Halloween?), or diving into electronics with tools like Arduinos, there are endless opportunities to make learning hands-on and engaging. You're not just teaching concepts — you're giving students a tangible experience that helps them see physics in action.

Another advantage of being a physics teacher is the unique ability to close the door to the outside world and focus on what we love—teaching physics. In a time when external distractions, especially the current political climate, can feel overwhelming, it's refreshing to be able to shut out the noise. Many of us teach in districts where families are split evenly across political lines, and classroom discussions can sometimes veer into heated debates. But in physics, we are fortunate to have a subject that allows us to keep things focused on discovery, problem-solving, and curiosity, thus providing students with a space that is free from those outside pressures. It's a luxury to simply enjoy the science with our students.

Another plus is that many of our students are motivated, often more so than the average high school student. Since most of them have already set their sights on college, they tend to be more focused and engaged. This typically helps filter out major behavioral issues, which means you can spend more time teaching and less time managing distractions.

If you're new to teaching or looking to move up the salary scale, this might be the perfect time to think about professional development. One option to consider is enrolling in a leadership program that prepares you for administrative roles. Now, you might not be thinking about becoming an administrator right now, but having that certification in your back pocket could open up new doors in the future. If, after earning the certification, you find that administration isn't for you, no problem! You can always step back into the classroom, close the door, and get back to doing what you love—teaching physics.

In the end, whether you're experimenting with new demos, building projects with students, or considering your future career options, teaching physics offers a mix of creativity, intellectual challenge, and job security. It's not just a job—it's a rewarding and dynamic path that allows you to make a real impact on your students while having a great time along the way. So, if you're already in it or just starting out, I hope you're as excited as I am about all the possibilities that come with teaching physics. It really is a pretty good gig!

Important Dates

Fall Conference	**Sat, Oct 26**
Physics Olympics	**Wed, Mar 19**
Spring Conference	**Sat, Apr 5**
AP Physics 2 Exam	**Tues, May 13**
AP Physics C Mechanics	**Wed, May 14**
AP Physics C E & M	**Thurs, May 15**
AP Physics 1 Exam	**Fri, May 16**
AP/IB Analysis	**Sat, May 31**
Regents Physics Exam	**Tues Jun 24**
End of year BBQ	**Mon, June 30**

Check the LIPTA website ***www.lipta.org***

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STEP UP

Supporting Teachers to Encourage the Pursuit of Undergraduate Physics

In the last LIPTA newsletter we wrote about STEP UP, which was created by several physics organizations to try to increase the number of physics undergraduates by increasing the number of females and minorities studying physics. Their suggestions are good for everybody, and these suggestions could increase the number of students in all of science and technology, not just in physics.

Two of STEP UP's suggestions for when you are talking to individuals:

- Direct other students to female students (and minorities) for help
- Direct students toward clubs, camps, internships, or other programs

Through the STEP UP program a student commented: "Other students asked me questions like how did you understand it this way, can you explain it to me in a simpler form? Exchanging ideas helped me realize how much I knew." Your actions make a difference.

STEP UP material is based upon work supported by the National Science Foundation.

https://engage.aps.org/stepup/curriculum/everyday

Need CTLE credits?

- Fall and Spring Conferences (3 credit hours for each conference)
- AP/IB Physics Exam Analysis (3 credit hours)

CTLE Certificates are available.

Exploring Modern Physics at Brookhaven: A Personal Experience with the QuarkNet Workshop

by Diana Nigro

Participants attending Quarrket 2024 at BNL

This past June, after the school year wrapped up, I had the privilege of attending the QuarkNet workshop at Brookhaven National Laboratory. It was an immersive two-day professional development experience that proved invaluable for me as a high school physics teacher with 13 years of teaching under my belt. The workshop ran from 9 am to 3 pm each day, with a small group of about 10 teachers, all eager to dive into the latest in modern physics and classroom applications.

The QuarkNet Collaboration is a national program designed to connect high school science teachers with particle physicists at the cutting edge of their field. Over the course of the workshop, we were introduced to authentic physics research and teaching strategies, all of which have direct applications to our classrooms. The focus of the workshop which emphasized hands-on activities and real-world applications was perfectly aligned with my goal of providing meaningful, relevant experiences for my students.

One of the most rewarding aspects was touring parts of the lab that was guided by passionate graduate students. They not only explained how the lab functions, but also allowed us to see the intricate components that go into the particle accelerator including learning firsthand about how physicists troubleshoot issues at this level. It gave us a tangible connection to the work we would soon share with our students.

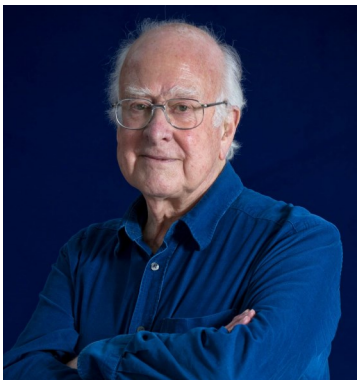
The workshop wasn't just theoretical; it was packed with practical activities I couldn't wait to bring back to my classroom. For example, I plan to use the quarks puzzle app to help students explore baryons and mesons and discover the rules of the Standard Model for themselves. For Regents Physics, I can now introduce modern physics topics like energy-mass equivalence and particle collisions in a way that feels real and relevant. With resources like HYPATIA Online, my students will analyze subatomic collisions to calculate the mass of the Z-boson and practice essential graphing skills along the way.

The applications of the QuarkNet experience are vast, spanning from introductory topics like momentum conservation to advanced discussions in AP Physics C, where students can connect real-world data analysis to their statistics coursework. Whether it's using vector addition to solve modern physics problems or discussing the role of data handling and error analysis, this workshop offered us tools that enhances not just student understanding but also critical thinking.

For anyone seeking to enhance their physics curriculum, I highly recommend attending the QuarkNet workshop at the end of this school year. It's a unique opportunity to experience modern physics in action and bring those experiences back to inspire your students.

Did You Know …

by Harry Stuckey



Did you know that Peter Higgs, namesake of the elusive scalar boson, died this past April 8th at the age of 94? The *New York Times*, the BBC, many science journals, and NPR ran obits, but most of the mass media (no pun intended) took little notice. Unlike the furor over the discovery of the boson in 2012, his passing was marked with little fanfare, which is probably how Dr. Higgs would have preferred it. By most accounts, he was a shy, modest man who did not seek the limelight and was more interested in his work than fame. According to the *Times*, "he didn't own a television or use email or a cellphone". One colleague said, "He was a little too retiring, perhaps, for the good of his own career."

Dr. Higgs developed an interest in physics while attending Cotham School in Bristol, as did one of his idols, Paul Dirac, a father of quantum mechanics. Dr. Higgs spent most of his career at the University of Edinburgh, the alma mater of James Clerk Maxwell, another of his idols. In the early 1960s, Dr. Higgs began to ponder why some particles have mass, but there was no "eureka moment". In 1964, he and two groups of physicists independently published papers pertaining to the now famous boson. He originally intended to explain aspects of the strong force by suggesting an invisible field of energy permeating space that would act on particles to produce mass. His first paper was rejected, so he "spiced it up" by adding the prediction of a new particle resulting from a vibration in this field.

While strong force theory went in a different direction, Dr. Higgs' field and particle would be critical in weak force theory, specifically in 1967 when Steven Weinberg included it in the unification of the weak and electromagnetic forces. It took until 1972 for Fermilab's Benjamin Lee to call the hypothetical particle the Higgs boson, and the name stuck. The name was later extended to the underlying field, much to Dr. Higgs' embarrassment and the annoyance of other theorists who had independently produced the same ideas. While the importance of the subsequent identification of the Higgs boson is undeniable, it is equally remarkable that nearly 50 years earlier several theorists working with pencil, paper, and an incomplete theory were able to predict the particle. And thankfully, both Dr. Higgs and Francois Englert, one of the "other theorists", were both still around in 2013 to accept a well-deserved Nobel Prize.

A Higgs Boson walks into church. The priest says, "You can't come in here, we don't allow Higgs Bosons." The Higgs Boson says, "But without me, how can you have mass?" Check out other silly physics jokes at *Boredpanda.com.*

Do you have any comments, information, or tips to share for future newsletters? Send it via email to: *keogh@lipta.org*

LIPTA FALL CONFERENCE
SATURDAY, OCTOBER 26
8:30 AM—NOON
SACRED HEART ACADEMY

8:30 - 9:00 Registration with coffee, breakfast and camaraderie

9:00 - 9:15 Welcome

9:15 - 10:30 Using Paul Andersen's 10-step Story Line to develop a Kinematics Unit
Rich Slesinski and Justin King

This presentation will focus on the process and insights gained while writing a kinematics unit plan incorporating the Next Generation Science Standards (NGSS). The unit plan was created using a ten-step storyline process that included creating an anchor chart, writing enduring understandings, developing essential questions, designing an assessment, and creating a list of phenomena with corresponding learning expectations, experiences and performances. Both the process of creating this kinematics unit and the final product will be shared.

10:30-11:00 Break for more camaraderie

11:00-12:00 Evaluating a Kinematics Assessment
Rich Slesinski and Justin King

Attendees will use an 11-point 3D Assessment Screening Tool to evaluate the final kinematics assessment that was created by using the NYSSLS/NGSS guidelines. They will explore computer simulations that allow students to discover the differences between distance & displacement and average speed & average velocity. The presenters will share individual lesson plans structured around the 5E student-centered model (Engage, Explore, Explain, Elaborate, Evaluate). A video will be shown of students testing their solutions to the anchoring problem in which they predict where two moving objects moving toward each other will meet. Participants will leave with practical tools and insights to support their own development of NYSSLS/NGSS curriculum.

Cost: Members $15
Non-members $30 (includes a 1 year membership)
Register online at www.lipta.org
CTLE certificates for 3 credit hours will be available.

Sacred Heart Academy is located at 47 Cathedral Ave, Hempstead, NY.
Please park in the back of the school