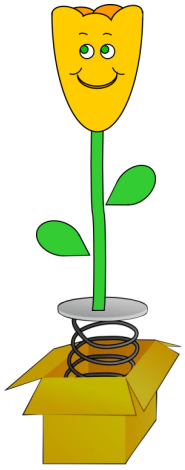
Spring, 2023

Issue 53



Long Island Physics Teachers Association Newsletter

President's Message

Somehow we've made it to the end of another year. As usual, there have been good times and not so good times. Now, however, is a great time to look forward to both the summer and to next year.

What do you like to do in the summer? Among other things, I like to read, a pleasure that I don't get enough of during the school year. The first thing that I do in the summer is to spend two days inhaling a book or two. My pleasure in reading books has me thinking about literacy and my students, and what my role is or should be in helping them become readers. I teach physics. Should I be helping them to read? And do our students even need to read anymore? With the availability of so many good videos, are they better off watching videos? I want to suggest that, while watching videos is a good start and a gentle introduction to any topic, our students will learn better and in more depth if they supplement their video watching with text.

One reason to read is that students are much more actively engaged when they read than when they watch a video. With thorough material and an active mind, they can learn both more broadly and more deeply than they would by watching videos. Of course. I'm not talking about the students whose eyes pass lightly over the words while they're thinking about something else. Instead, I want them to learn to read actively, with full attention, thinking critically and asking questions and looking for answers. This is a skill that could serve them well in the future. Learning actively is so much easier to do with a book than with a video, if only because a video progresses linearly and it's so hard to skip forwards and then backwards to visit and revisit key points.

Good readers are also much better writers, or so I've heard. Every single one of my students could benefit from being a better writer, so if reading more will set them in that direction, it's worthwhile just for that. On the other hand, has the advent of chatGPT made good writing obsolete? Will students and employees of the future just ask chatGPT to generate their letters, presentations, and reports for them? I think probably not. Full disclosure here: I asked chatGPT to help me write this article, and while it came up with some good ideas, I couldn't directly use any of the material it gave me. I think our students will still need to be able to write.

So I know that I want my students to read, but I'm conflicted about what to ask them to read. One option is that I could ask them to read the

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Important Dates

Regents Physics Exam	**Thurs Jun 22**
End of year BBQ	**Wed Jun 28**

Check the LIPTA website ***www.lipta.org*** for any updated information.

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textbook. It's hard work and many won't read it, but for those who do, they gain a broader understanding of the material. Or, I could ask them to read the online textbook Open-Stax.org (so many textbooks, and all of them free!), which is easier to read than the paper textbook. It has supplemental resources like short videos, but it doesn't go into as much depth as the paper textbook. Or I could ask them to read something easier like the Manga Guide to Physics, which is much easier to read, and even entertaining, but is really only a brief introduction. Or we could do a project, like reading biographies, or even David Bodanis' very readable $E=mc^2$. There are lots of options, so this summer I should come up with a plan to spend some time next year developing my students' reading skills.

I come back to the idea that I want my students to read, and that reading physics will help them both in physics and in the future. So part of my summer plans include reformulating a strategy to help my students on their path to scientific literacy, while some of my plans include reading for my own pleasure. I hope you have a great book to read too.

Do You Need Professional-hour credits?

⇒Attend the Fall and Spring Conferences (3 credit hours for each conference)

⇒Attend the AP Physics Exam Analysis (3 credit hours)

CTLE Certificates are available.

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

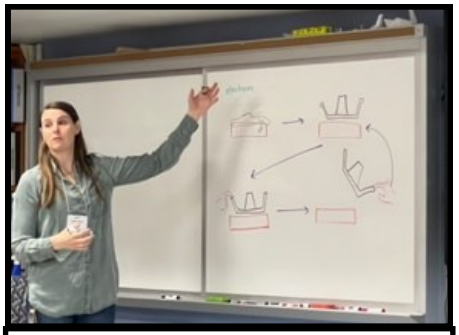
LIPTA Spring Conference Synopsis

The annual LIPTA Spring Conference was held at Northport HS on Saturday, April 29th. About twenty-five members attended the conference which featured a presentation by Northport teacher, Karyn Libretto, and LIPTA exec member, Harry Stuckey. Everyone was welcomed with a delicious spread of food provided by LIPTA treasurer, Tania Entwistle. LIPTA President, Gillian Winters, greeted everyone and began the conference by discussing future events including the AP Physics exams reviews, the End-of-Year BBQ, and the Quarknet Summer workshop.

Karyn gave us a brief taste of what will be expected with the new NYS Science Learning Standards coming up in the next couple of years with her presentation: *NGSS/NYSSLS: Phenomena and Anchoring Activities.* With the new standards, there is a big push for more student-centered learning and less conventional teacher-led lectures.

In the more traditional classroom, students would be creating, evaluating and analyzing as the end products of learning a unit; however, the new standards stress this as the starting point of a student's learning experience. In this new culture, teachers are more like coaches or thought partners. The job of the teacher is less about imparting knowledge, but more about engaging students so they become responsible for their own learning. The teacher will aid in their learning journey by monitoring them, redirecting them and encouraging them to question and formulate properly.

To help students learn by this method, it is strongly encouraged that teachers develop some anchoring phenomena for each unit. Karyn demonstrated a couple of activities to show how she is using anchoring phenomena with her students. One activity was the "Fido" or roll back can that she made. When rolled across the floor, the can rolls forward then stops and returns back. She uses this phenomenon as an introduction to energy and has students just make observations and describe the behavior. From there, they then need to explain it and develop a model of it. Karyn explained that a model is a simplified representation of a system that can help explain and predict and can include diagrams, annotations, labels and mathematical representations. And it's important in the new standards that students can develop models to help them understand and explain what is happening. Karyn shared two more activities. One involved a tug-of-war with a rope to help students understand vectors and another had us playing with a homemade electrophorus that used a piece of Styrofoam and an aluminum pie plate with a cup.



Karyn discussing the electrophorus activity.

Anchoring phenomena is a great way to increase curiosity and getting students interested in trying to figure things out. As Karyn told us, "An anchor holds you in place so it's something to keep you in place and you keep returning to the activity throughout the unit." Copies of Karyn's activity worksheets are available on the LIPTA website.

After a short break that gave teachers a chance to talk and share ideas, Harry Stuckey gave a brief history of the neutrino in his presentation titled: *A Brief History of Neutrinos (With Apologies to Stephen Hawking).* Harry started the presentation by having us hold out our thumb and told us how millions of neutrinos were passing through our thumb each second which we are totally unaware of. Harry began by discussing the earliest models of

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the atom and its constituent parts and how the models changed over time by the experiments that were conducted by a variety of scientists.

Even though the naming of the neutrino is attributed to Enrico Fermi, it's discovery was the result of several scientists. Harry mentioned that Wolfgang Pauli proposed that an electrically neutral particle was involved in beta decay. Most likely, Charles Ellis and his student, William Henderson, probably discovered it when their experiments showed that another particle was involved in beta decay, but did not realize that particle was probably a neutrino. Enrico Fermi built upon these ideas and experiments to propose the neutrino's existence in the beta decay of a neutron into a proton in the early 1930s. And it was most likely one of Fermi's assistants that coined the term "neutrino" to distinguish it from the neutron recently discovered by James Chadwick. But it was over 20 years later that the neutrino was actually detected in experiments performed by Clyde Cowan and Frederick Reines.

Gillian introducing Harry with his neutrino presentation.

Harry gave us a little taste of some of the personal lives of the scientists that were involved in the discovery of the neutrino and also discussed many other physicists that went on to do experimentation involving neutrinos. His lecture and PowerPoint presentation can be found on the Lipta website at:

https://lipta.org/2023/05/04/spring-conference-2023-materials/.

Karyn Libretto's presentation can also be found at this same link in case you weren't lucky enough to attend the conference.

LIPTA BBQ

Wednesday, June 28

3PM-6PM

Blue Point, NY

Free for all current LIPTA members. So enough food can be provided, please RSVP at https://lipta.org/lipta-bbq-2/.

Location information will be emailed prior to the event to all registered persons.

Long Island Physics Olympics 2023

The 37th Annual Physics Olympics was held at Farmingdale State College on Thursday March 16th. This year's competition involved 14 teams from different parts of Long Island competing in five events. Overall winner this year was Mepham HS. Second place went to Smithtown East HS and its sibling school, Smithtown HS West, took 4th place. The 3rd place trophy was won by MacArthur HS.

As per tradition, the *Physics Bowl* and *Fermi Questions* are standard events. The *Physics Bowl* is a quiz event where teams try to buzz in the correct answers first. Mepham HS won the event this year. The *Fermi Questions* event includes five estimation questions that students must figure out without the use of any reference materials or calculators. Smithtown East HS earned the top score in this event.

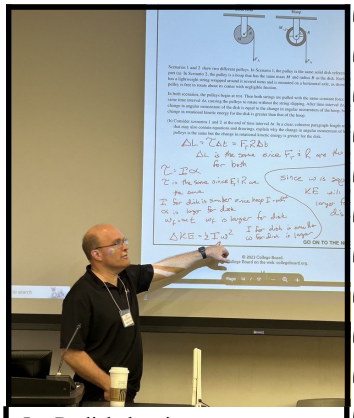
On the Glidepath is an event where students have to construct a paper airplane that will travel the farthest, but also travel fairly straight along a center line. Smithtown East was the winner in the event. There were two new events this year. One event, *Precisely Predicting Projectiles*, had students predict where a steel ball would land when it rolled down a wooden ramp onto a table top and then rolled off the end of the table to the floor. Syosset was the best predictors. And the second new event, *Something to Torque About*, had students figuring out the mass of an altered metal meterstick using the principle of torque. Syosset also took top honors in this event.

The T-shirt contest was won by Smithtown East with their green (for St. Patrick's Day) shirt with the Olympic rings showing different physics motifs. Congratulations to all the participants.

Anyone interested in helping out with next year's Physics Olympics should contact Justin King who coordinates this annual event at *king@lipta.org*

Physics Exam Review

This year's AP Physics/IB Exams Analysis took place at a new time and place. NYIT Physics professor, Chinmoy Bhattacharjee, was kind enough to host us in a very spacious lecture room at the campus in Old Westbury on Saturday, May 20th. And he graciously supplied us with coffee, tea and delicious cookies and pastries!



Joe Rodichok going over answers to the AP1 exam.

Joe Rodichok of Smithtown East HS presented solutions and led the discussion for AP Physics 1. Syosset's Rich Slesinski followed with his analysis of the AP C Mechanics Exam and supplied copies of solutions to the E&M exam. Justin King from Commack HS presented solutions to the Physics IB exam and provided some great insight into this course which few of us have much experience with. Rob Krakehl provided copies of his answers for the AP Physics 2 exam.

If you didn't have a chance to come this year, make every effort to come next year. It's a great way to discuss the exam informally and it also provides 3 CTLE credits!

Did You Know …

by Harry Stuckey

We all know of Sir Ernest Rutherford's Gold Foil or Alpha Scattering Experiment, which established the nucleus as the positive center of the atom. But did you know that work is also referred to as the Geiger-Marsden experiments (plural intentional)? In 1906 when Sir Ernest was a professor at the University of Manchester, he met a young PhD named Hans Geiger (yes, THAT Geiger) and invited him to work there on a fellowship. Today we would call Hans a post-doc. Rutherford was deeply involved in researching alpha particles and needed a means of counting the alphas given off by his sources. He and Geiger devised a simple device that used the ionizing ability of the alphas to produce an electrical pulse. This was a precursor to the Geiger counter, but it proved unreliable as the alphas were deflected by collisions with air molecules inside the detector. Rutherford tasked Geiger with investigating the degree of scattering that occurred when alphas interacted with matter. This led to a series of experiments between 1908 and 1910 supervised by Rutherford and performed by Geiger and Ernest Marsden, who began as an undergraduate and ultimately earned a DSc. These experiments provided the data for Rutherford's monumental conclusions. Much of the work involved counting alpha particles at various points around the apparatus. To do this, they visually observed fluorescent screens which would emit a tiny flash of light when struck by an alpha. This was done in a totally darkened room through a microscope. To minimize external light, data was taken at night in an interior basement room with no windows. Geiger and Marsden would sit in the dark room for 30 minutes to fully dilate their pupils and then perform the experiment. Given this grueling procedure, is it any wonder that in the 1920s, Geiger collaborated with Walter Mueller to perfect the counting detector that bears his name.

Summer QuarkNet Workshop

Brookhaven National Lab / Stony Brook University QuarkNet Center

Did you join us for the Spring conference, heard Harry Stuckey's fabulous presentation on neutrinos, and now have even more questions about those mesmerizing particles? If so, then join us at the QuarkNet workshop as we take a deeper dive to learn more about neutrinos. The workshop will include

- Keynote speakers
- Analysis of real data— neutrino oscillations (MasterClass style)
- Exploration of neutrinos

Location: Stony Brook University
Dates: Monday to Thursday, June 26 - 29
Times: 9:00 am - 4:00 pm (early release on Wednesday to attend the LIPTA BBQ)
Stipend: No fee; stipend of $400 to current teachers for attending

CTLE credit: 28 hours

Open to physics teachers (not a physics teacher? Send us an email).
Want to join us? Register at:
https://docs.google.com/forms/d/e/1FAIpQLScBZXf5eHsfOw6fGvsD5Eb0-EC2KqzOXEKhMy2paw7yMdlh-A/viewform

Questions? Email winters@lipta.org