Winter, 2025

Issue 58

Long Island Physics Teachers Association Newsletter

Important Dates

Physics Olympics	Thurs, Mar 20
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*** for any updated information.

President's Message

As the school year progresses, I find myself reflecting on how fortunate we are to teach physics. There's something uniquely rewarding about working with the students in our classes. Just this week, I had conversations with my juniors about their course plans for next year, and these discussions always begin with their aspirations for college and beyond. I'm continually amazed by the diversity of their interests and goals.

Sure, I'd love it if every student left my class so inspired that they all wanted to pursue careers in engineering or physics. But the truth is, their ambitions span an incredible range. Some are drawn to languages and international studies, others to psychology, medicine, or veterinary sciences. Of course, there's always a good number heading toward engineering, and every now and then, a student surprises me by veering toward physics—sometimes even after swearing they'd never do so. Actually, over the years, a surprising number have gone on to study physics.

Our students' diverse passions are a reminder of why teaching physics never gets old. Non-teaching friends of mine sometimes ask, "How can you keep teaching the same thing year after year?" I think they picture elementary school teachers trying to teach shoe-tying and lining up. But even if we're tackling the same foundational principles—like explaining for the hundredth time that a net force causes acceleration (not the other way around!)—it's the variety of how we approach those lessons and the individuality of our students that keeps it exciting.

We are lucky in physics to have an endless supply of examples and phenomena to bring concepts to life. Every class and every year presents new ways to engage students: from hands-on experiments to student-driven projects, physics invites exploration. There's nothing quite like watching students tackle a challenge, whether they're designing a contraption for an egg drop or exploring the intricacies of rotational motion. You can see the moment when the light bulb clicks—not just about physics concepts, but about their own ability to problem-solve and learn.

Physics offers our students opportunities to think critically, connect ideas, and develop skills they'll use no matter where they go in life. And as teachers, we get a front-row seat to that growth. Each student brings their own perspective, their own spark of curiosity, and their own determination to understand the world around them.

So, as the year moves forward, let's take a moment to appreciate how lucky we are. We're not just teaching formulas and laws of motion—we're helping shape a generation of thinkers, creators, and dreamers. Whether they end up in physics, engineering, medicine, or another field entirely, the journey they take through our classrooms leaves a mark.

Here's to the privilege of teaching physics and to the students who make it all worthwhile!

STEP UP

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

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. 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.

STEP UP reminds us that in group activities, all students should have equal opportunity to assume active roles and contribute to group discussions. Female students are often marginalized in group work due to unsupportive group dynamics and having less prior experience with physics experimentation.

Choose group members

* Ensure women are taking active roles
* Avoid isolating women in a group of mostly men

Scaffold group collaboration

* Bolster confidence around lab equipment and trying things out
* Teach collaboration skills during or before initial group activities

STEP UP (Supporting Teachers to Encourage the Pursuit of Undergraduate Physics) material is based upon work supported by the National Science Foundation.

Need CTLE credits?

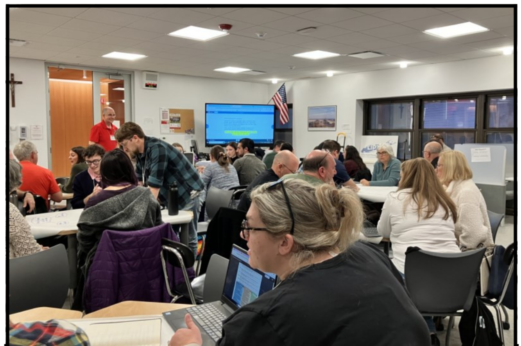
- Fall and Spring Conferences (3 credit hours for each conference)
- AP/IB Physics Exam Analysis (3 credit hours)

CTLE Certificates are available.

Fall Conference Highlights

There was a packed house at Sacred Heart Academy with over 50 teachers gathered to learn more about teaching toward the Next Generation Standards. As usual, the conference began with a wonderful breakfast put together by Treasurer Tania Entwistle. VP Bill Leacock gave a brief update to some of the changes to the new Regents curriculum. These changes will include new required labs and the topics of optics and heat being added into the course. The first exam will be optional and offered this upcoming June.

Syosset's Rich Slesinski then took over showing us how he approaches his classroom lessons by making us his students for the next hour. He has trained his students to respond to his daily inquiry of how they are doing today by enthusiastically claiming "Totally awesome, sir!" He feels that sets a positive tone and opens their minds to learning, and though AI can do a lot of things, it can't give the personal touch like a teacher can to get the students involved.



Physics teachers working in groups to develop a flowchart for a kinematics unit.

As Rich demonstrated throughout the presentation, teaching is more than just academics, it also involves social and emotional investments to learning. With this in mind, we were placed into groups and did a little ice breaker where we shared our names and favorite Halloween candy. And then took that a step further, by going around the group for each of us to say the name of the person and their favorite candy. This helped us bond better in just a few minutes. Now we were ready to start the lesson.

Rich said that everyone often goes into a subject with prior knowledge that may or may not necessarily be correct or the same as other people's. Just like he does with his students, he gave us a problem without any information being transmitted to us except the task at hand and then each group had to develop a flowchart which encouraged discussions among the group. Our task was to develop a flowchart on how we would approach creating a physics unit that is aligned with the new standards set forth by the NYSSLS. Once our flowcharts were done, they were displayed and each group discussed how they developed their plan. Similarities and differences were pointed out and then Rich presented us with 5 different exploring approaches to creating a lesson unit:

Understanding by Design
Ambitious Science Teaching
The Learning Cycle Model
Project Based Learning (PBL)
The 5 E's of Inquiry Based Science

Each member of the group was now given a packet describing one of these writing models to read through and report back about it to their group. Discussions showed similarities and differences with each approach, but most importantly it gave us some direction on how we should pursue our task.

Rich Slesinski discussing a group's flowchart.

Rich pointed out that it's important for students to be actively engaged in the learning process and sometimes they need a nudge to keep on task. He said he uses *Nearpod*, an interactive tool that students can access on a laptop or mobile device, and that teachers can use to monitor responses. He also stressed how the standards are not really new, but they just are being embedded in the framework of the NGSS for the first time. He stressed that the *Wonder of Science* site by Paul Andersen has a plethora of material to help teachers develop plans. It should not be the goal to have our students simply understand basic physics concepts, but rather to have students use physics as a vehicle to understand the science and engineering that crosscut all the other sciences as well.

So, how do we begin to write a physics unit, for example, on kinematics? You need to develop a storyline just like you would for a movie or book. Rich suggests to start with the *Wonder of Science* site. There you will find the Science and Engineering practices (in blue), Disciplinary Core ideas (in yellow) and the Crosscutting concepts (in green) for various units. Make an anchor chart of what needs to be incorporated into the kinematics unit. Have students make their own anchor charts too. Start with the big idea of motion and then narrow it down to motion in equilibrium and non-equilibrium. Choose the standards that need to be addressed. Brainstorm the content. Write out the enduring understandings which is what you want students to still know later in life. Create essential questions which become the hook of the unit. Then do an order of the experiential lessons that become the plot of your "story".

The performance assessments that you develop is the feedback like you would get from a critic. The anchoring phenomena is the conflict in your story and the learning performances are the chapters. The final assessment (the big unit test) should be written at the beginning to give you a goal, but needs to be examined again to help you make revisions in your story. We know how the ending should be, it's all about the journey of how we get there. In a sense, the students are the stars of a movie and we are the directors. Hopefully with the new standards, we will make a blockbuster unit for future generations!

After a break, Justin King from Commack HS did a quick demonstration of the 3D screening assessment tool card that is given on the *Wonder of Science* site. To practice using the 3D tool, everyone was given a copy of an assessment based on the kinematics unit that Rich Slesinski created. Participants had to use the 3D screening assessment card to evaluate whether the assessment followed the required 5 steps on the checklist and how many of the optional steps were also incorporated in the assessment. Justin stressed how important it was to use the checklist to evaluate any type of assessment that a teacher will be using to ensure that it is following the standards.

If you missed the conference, you can view the highlights on Youtube:

Fall Conference Part 1

Fall Conference Part 2

Physics Olympics
Thursday, March 20
8:30 to 1 pm
Farmingdale University

Events

Physics Bowl

Fermi Questions

Slow Roller

Bowling for Glory

The Torque of the Town

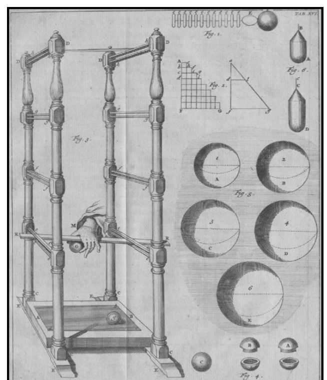
For more information and to register:
https://lipta.org/physics-olympics-2025-details/
Registration is limited to 18 teams.

Did You Know …

by Harry Stuckey

How do you introduce kinetic energy? Maybe you start with a falling object demo or crash a cart into some blocks. Discuss KE as energy associated with motion. Go on to derive the formula. Start with the Work-Energy Theorem, $W = \Delta KE$, and assume an initial speed of zero so $KE_i = 0$ to get rid of the delta and simplify the derivation. Now substitute $W = Fd$ followed by $F = ma$ and $d = at^2/2$ giving $KE = (ma)(at^2/2) = ma^2t^2/2$. Since $v = at$ (remember, v_i is assumed zero), $a^2t^2 = v^2$, and voila, $KE = mv^2/2$. All nice and neat, but this is not the way it happened.

The terms "work" and "kinetic energy" in their present physical meanings date to the mid-1800s. In 1829, Gaspard-Gustave Coriolis outlined the mathematics of kinetic energy. William Thomson, Lord Kelvin, is credited with coining "kinetic energy" around 1850. However, the foundation for this work was laid in the late 17th and early 18th centuries. Galileo demonstrated in the early 1600s that motion could be analyzed mathematically and described using formulas. By the mid-1600s, the "quantity of motion" (what we know as linear momentum) was found to be measured by the product of mass and velocity. Isaac Newton and Rene Descartes both advocated for the conservation of momentum, which is implied in the Third Law of Motion. The concept of "force" was also well developed by then, but energy, not so much. A controversary arose over the vis viva or "living force", which originally described the force associated with a moving object and would evolve into kinetic energy. Many, including Newton, felt that vis viva was momentum, but not everyone.



's Gravesande's Foundations for Mechanics (*Springerlink*)

Between 1676 and 1689, Gottfried Leibnitz noticed that in many systems consisting of i particles, it was not just the sum of $m_i\mathbf{v_i}$ that was conserved, but also the sum of $m_i v_i^2$. These were, of course, elastic collisions and depended on the relationship $E \alpha mv^2$. The prestige of Newton and Descartes influenced most contemporary scientists, who accepted that momentum was vis viva. This changed in the 1720s with the experiments of Dutch professor Willem 's Gravesande. He dropped brass spheres from varying heights onto a soft clay surface where they made impressions. Each sphere's vis viva could be measured by the amount of clay displaced and was shown to be proportional to v^2. 's Gravesande conveyed these results to a French noblewoman, Emilie du Châtelet, who repeated and extended his experiments. She was able to show that spheres of the same radius, but different masses, would make the same size indentation in the clay if mv^2 was the same for each sphere; therefore, that quantity must be associated with vis viva, as per Leibnitz. In doing so, she became the first to explain the concept of energy. How did a French noblewoman manage that? That's a story for another column!

More Silly Physics Jokes

How do you fix a short circuit? *You lengthen it.*

What is a magnet's favorite sport? *Pole Vaulting*

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

Spring conference
Saturday, April 5
Syosset HS
8:30-Noon

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

9:00 - 9:10 Welcome

9:10- 10:00 Lenses and Mirrors Anchoring Phenomena
Barbara Speight & Joanne Schwager

Good News! Optics is coming back to Regents Physics. Captivate your students' interest with eye popping demonstrations and interesting lab activities. In this workshop we will present easy-to-set-up phenomena and show you what equipment you may want to order to prepare for the new learning standard.

10:00-10:30 Break for more camaraderie

10:30-12:00 NYSSLS Lightning Round

Presenters share 10 minutes of their NYSSLS Lessons involving Enduring Phenomena, Essential Questions, and relevant assessments

* Sara Whitiker – Assessments
* Chris Zangler-Scaduto – Circuits
* Spencer Milito – Energy Bar Graphs
* Bryan Palermo – Motion Sensor Data
* Andrew Walsh – Enduring Understandings
* Carrissa Giuliano – Phenomena

Cost: Members $15 before Mar 29, $20 after or at the door
Non-members $30 (includes a 1 year membership)
Register online at www.lipta.org
CTLE certificates for 3 credit hours will be available.