



**NJAAPT**

**New Jersey  
American Association  
of Physics Teachers**

**AAPT**  
PHYSICS EDUCATION

**Spring 2015  
Section  
Meeting  
March 14, 2015  
Princeton University**

# *Welcome to the New Jersey AAPT Spring Section Meeting!*

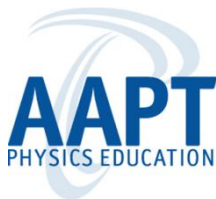
The title and focus of the 2015 section meeting is “*New Standards in Physics Education*”, with emphasis on the Next Generation Science Standards (NGSS) and the new AP Physics 1 & 2 courses.

In addition, there will be small-group breakout sessions on each topic, plus a session about Physics competitions, and ending with a Demonstration Show.

Special thanks to Geoffrey Gettelfinger from Princeton University for his help and the use of Princeton facilities. Thanks also to the Executive Board for all of their planning efforts, and to Jessie Blair for coordinating the catering arrangements.

We especially thank our guest speakers, who have taken time out of their busy schedules to be here.

We hope that you will find the meeting informative and enjoyable, and we look forward to seeing you at future events.



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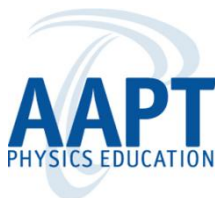
***Jim Ferrara***

***Dan Kaplan***

***Yitzhak Sharon***

***Justin Son***

***Rich Urban***



# **SCHEDULE of EVENTS**

**Saturday March 14, 2014**

**McDonnell Hall**

- 8:00 – 9:00 a.m. Registration,  
Coffee, Tea, Bagels
- 9:00 – 9:10 a.m. Introduction and Welcome:  
**Ray Polomski, John Valente**  
President, Vice President NJAAPT
- 9:10 – 10:00 a.m. **Suzanne White Brahmia**  
Rutgers  
*‘NGSS, the New AP, CCSS-Math:  
An Opportunity for Students to Develop  
Physicists’ Ways of Thinking’*
- 10:00–10:15 a.m. Break
- 10:15-11:00 a.m. **Colleen Weiss-Magasic**  
West Milford High School  
*“Tackling the Next Generation Science  
Standards”*
- 11:00 – 12:00 a.m. Lunch

# **SCHEDULE of EVENTS**

- 12:00-12:45 Robert Goodman  
NJCTL  
*“PSI Physics + NGSS =  
STEM Pathways for All Students”*
- 12:45 – 1:30 p.m. Breakout Session I  
Attend one of the following:
- *NGSS*
  - *New AP 1 & 2 courses*
  - *Physics Competitions*
- 1:30-1:40 Break
- 1:40 – 2:25 p.m. Breakout Session II  
Attend one of the following:
- *NGSS*
  - *New AP 1 & 2 courses*
  - *Physics Competitions*
- 2:30 – 3:30 p.m. **Demonstration Show**  
Aatish Bhatia  
Carolyn Sealton

# Suzanne White Brahmia

Rutgers University

## *“NGSS, the New AP, and CCSS-Math: An Opportunity for Students to Develop Physicists’ Ways of Thinking”*



Suzanne White Brahmia is the director of the Extended Physics program and the associate director for physics of the Math and Science Learning Center at Rutgers. She started her teaching career as a Peace Corps physics teacher in Gabon and she started her research career in solid state physics as a graduate student at Cornell. After she received her Masters degree from Cornell she followed her passion for researching and practicing the best methods of teaching physics. She earned her Physics Doctorate from Rutgers, with a specialization in Physics Education Research. She conducts research into mathematization in the introductory physics courses. Through her directorship of the University's Extended Analytical Physics course, offered

every year to ~150 mathematically underprepared engineering physics students, she has developed and implemented methods that increase success for students underrepresented in physics. She served on the National Research Council (NRC) Committee on Undergraduate Physics Education that produced the report “*Adapting to a Changing World - Challenges and Opportunities in Undergraduate Physics Education*” and represented New Jersey in the NRC's development of the Next Generation Science Standards, serving as an advisor for college-readiness in physics. She is the co-author with Peter Lindenfeld of the textbook, “*Physics, the First Science.*”

**NGSS, THE NEW AP AND CCSS-MATH:  
AN OPPORTUNITY FOR STUDENTS TO DEVELOP  
PHYSICISTS’ WAYS OF THINKING**

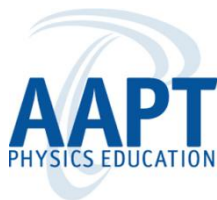
Physics is required for most STEM majors largely to help develop the habits of mind that typifies its professional practice. As the most mathematically creative of the introductory sciences, physics is strongly dependent on students’ conceptual understanding of the basic mathematics used, not just knowing how to do problems. The trifecta of NGSS, CCSS-math and the new AP tests, and the national consensus they represent, creates a tremendous opportunity for physics instruction, from its first course, to better meet the learning goals associated with developing physics habits of mind. In this talk I will describe recent work conducted at Rutgers that helps us better pinpoint the mismatch between entering engineering students current basic mathematical reasoning in a physics context with the expectations of the physicists who teach them introductory physics. I will show how the Practices articulated in the NGSS, the new AP and CCSS-Math show promise for improving the match based on how the Practices cluster into categories that coordinate nicely with

the habits of mind and practices that characterize expert physicists. Finally, I will describe briefly the PUM (Physics Union Mathematics) curriculum and associated resources - a research-validated curriculum that originated at Rutgers to better develop physics habits of mind in pre-college physics and which is now in the 5th year of implementation. PUM is designed to blend a mathematical way of reasoning with an experimental way of knowing in the 6-12 grade band aligning precisely with the practices outlined in the NGSS, the new AP, and the CCSS-math.

<http://www.physics.rutgers.edu/~brahmia/>



# *NOTES*



# Coleen Weiss-Magasic

West Milford High School

## *“Tackling the NGSS”*



A love of learning led Coleen Weiss-Magasic to become a teacher twenty-four years ago, at which time she set out to reignite a sense of wonder in her students and colleagues alike. Along the way she has presented at workshops and conferences, has published in peer reviewed journals, and has been awarded numerous grants, most recently from the Frederick L. Hipp Foundation. As a science teacher at West Milford High School, Coleen’s project “Swimming Upstream” partnered high school students with elementary students to study fish and local ecosystems, and was featured on Classroom Close-Up. Last year, Coleen was nominated for the Presidential Award for Excellence in

Mathematics and Science Teaching, and received the New Jersey Exemplary Secondary Educator Award.

## **TACKLING THE NGSS**

The Next Generation Science Standards, set to go live in the 2016-17 school year, are more expansive than standards of the past. As we prepare to write and revise curriculum to reflect these standards, it will be essential to become familiar with layout of the document and the three dimensions within: Disciplinary Core Ideas, Crosscutting Concepts, and Science and Engineering Practices. In this session we will look at samples of the Standards as well as the resources that are available to guide us in the creation of curriculum that reflects them.

# Robert Goodman

NJCTL

(NJ Center for Teaching and Learning)

***“PSI Physics + NGSS = STEM  
Pathways for All Students”***



Robert Goodman is the executive director of the New Jersey Center for Teaching and Learning (NJCTL), a teacher of science and engineering at the Bergen County Technical High School in Teterboro and 2006 NJ State Teacher of the Year. In 1999, he began the work that led to the Progressive Science Initiative and the Progressive Mathematics Initiative: programs that are having a dramatic impact in improving math and science achievement in schools around the world.

**PSI PHYSICS + NGSS =**  
**STEM PATHWAYS FOR ALL STUDENTS**

All states and countries are attempting to raise achievement in mathematics and science in order to improve social justice and international competitiveness; opening STEM career paths for all students. It was hoped that NGSS would address that need, but they do not due to serious gaps in content and weak connections to mathematics and problem solving: a problem recognized by authors of the NGSS. Mathematically rigorous physics, delivered with the PSI instructional paradigm, is the missing element that allows the NGSS to deliver on what educators had hoped for. PSI intertwines curriculum, pedagogy and assessment in a way which is welcoming to all K-12 students. It makes visible to them the rich connections between science and mathematics while building their skills in analytical thinking and problem solving: the keys to all STEM careers.

[www.njctl.org](http://www.njctl.org)

**Aatish Bhatia**  
**Carolyn Sealfon**  
Princeton University

*Where's the Pi?*  
*A Physics Demonstration Show*

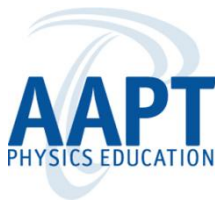


Aatish Bhatia is an associate director and engineering education specialist in Princeton University's Council on Science and Technology. He holds a doctorate in physics from Rutgers University and a bachelor's in physics from Swarthmore College. His popular science writing is published online by the Wired science blogging network and in print by Scientific American books, and he has co-developed online educational videos for TED-Ed and Minute Physics.

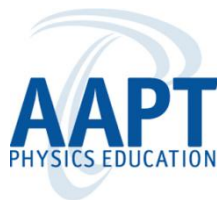
Carolyn Sealfon is an Associate Director of Science Education with the Council on Science and Technology at Princeton University. She received her Ph.D. in theoretical cosmology from the University of Pennsylvania and served as a physics professor at West Chester University prior to coming to Princeton. A past president of the Southeastern Pennsylvania Section of AAPT, she has sought out

opportunities to inspire more meaningful engagement with the wonder of science since her own days as a high-school student. Among her other passions, she loves to sing, and she will be performing immersive choral works by Paert, Taverner, and others with Princeton Pro Musica this evening (8pm in Princeton Chapel).

*Thanks to Omelan Stryzak for all of his technical help in planning and setting up the demo show.*

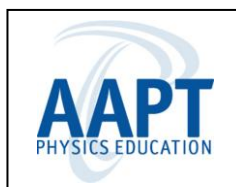


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