

COSMIC PATHWAYS

This work is supported by generous donations to the American Physical Society (APS) and the Physics Teacher Education Coalition (PhysTEC).



Developing a Career-Focused Regional Conference to Encourage High School and College Students to Pursue Physics in Higher Education

M. J. Wright



- In 9th grade most students take science, by college only a handful take physics. NCES/AIP
- Biology has 7 times as many majors as physics. datausa.io
- In High School, 47% of physics students are woman. This drops to about 25% in college.

AIP Female Students in High School Physics, APS Statistics on underrepresented racial and ethnic groups in physics

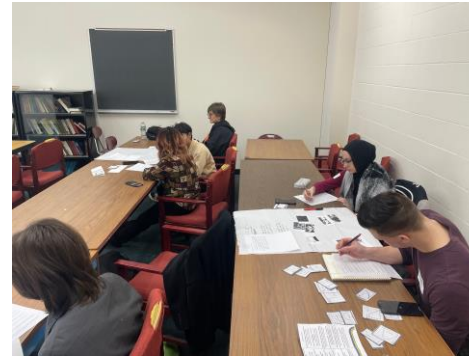
- **High School and Early College is where the issue is!** Step Up!



- We designed a new conference type for high school and college students to drive interest in physics.

- It was free
- It was regional
- It talked about careers
- It was student focused
- It was fun
- There was free food!

It took place on a Saturday in NYC at City College New York in March 2024.



We had a BIG team!



The City College
of New York



GE Aerospace

Turner

Building the Future



THORLABS



Stony Brook
University



UNIVERSITY of
ROCHESTER

STEP UP



SOCIETY OF PHYSICS
STUDENTS



Brookhaven
National Laboratory



NIST NATIONAL INSTITUTE OF
STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE



Co-authors and conference leaders:

M. J. Wright

M. Frey

K. Gifford

A. Kelly

J. Bier

B. R. Conrad

A. De La Puente

K. Douglass

K. Goldade

C. Giuliano

J. Hedberg

R. Krakehl

P. Mueller

Z. H. Ritee

L. Rodriguez

Z. Shafique

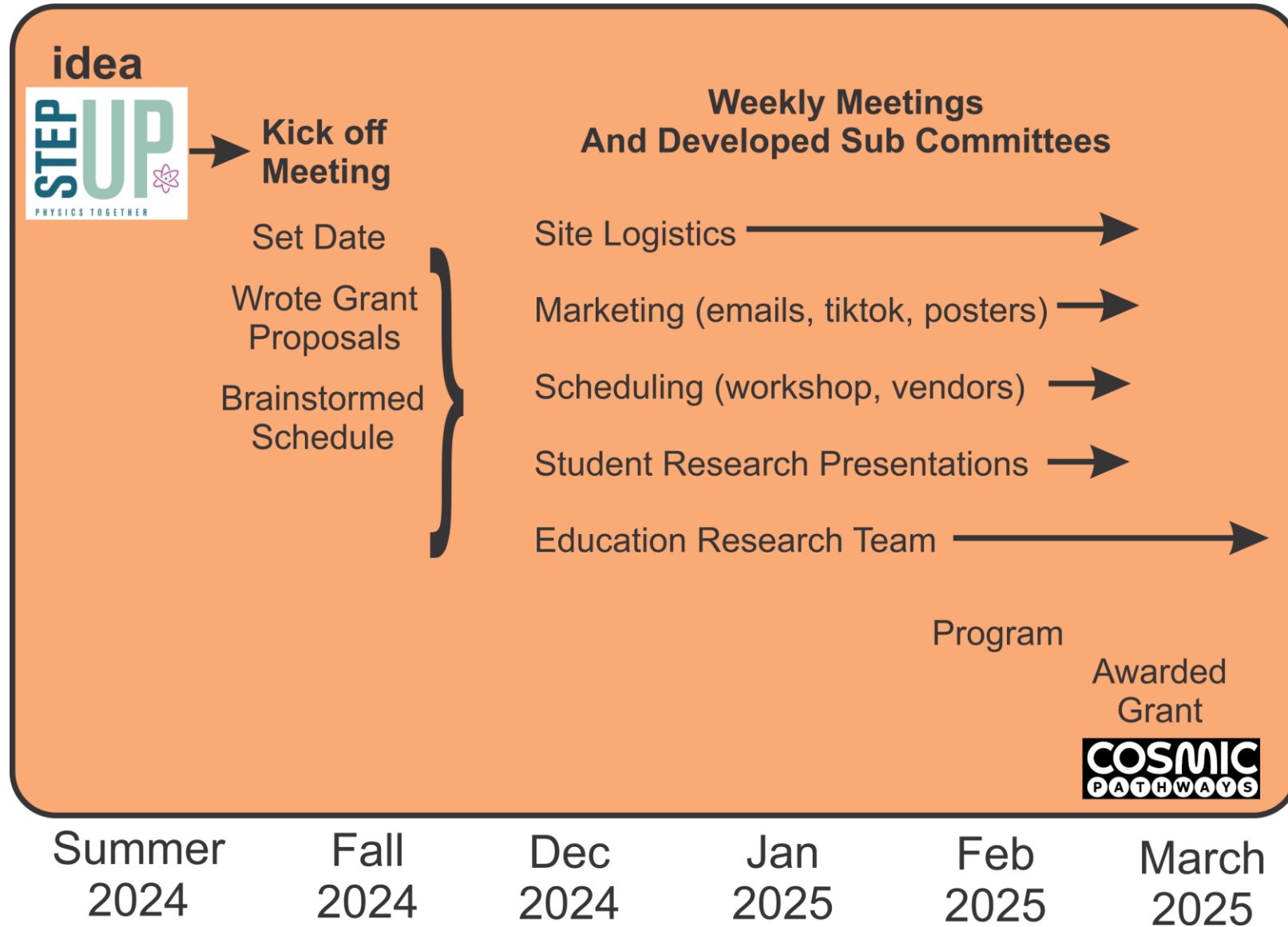
J. St John

L. Wade

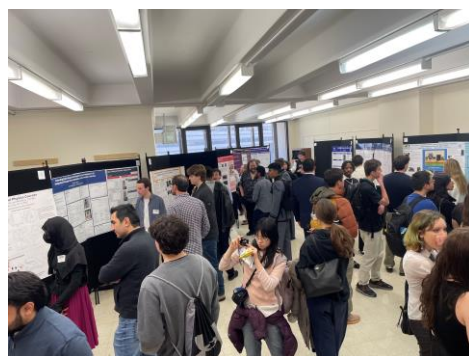
A. Zambuto



We had a BIG team! And it Happened Quickly!



Event	Topic
Be a Shark Workshop	Networking, career agency
Graduate Student Panel	Ph.D. concerns and pathways, material science
Physical Science Career Panel	Diverse career pathways and examples
Lunch	
College Floor Show	An opportunity to walk around and meet college physics departments and their physics clubs
Industry Floor Show	An opportunity to interact with companies that hire physicists.
Poster Session	Student presentations
Workshop and Student Presentations Part I	Students had 10 minute talks grouped in sessions with three talks Faculty and Industry experts were invited to do workshops
Workshop and Student Presentations Part II	Similar to Part I
Workshop and Student Presentations Part III	Similar to Part I
Keynote Address	Generate excitement for physics



180 students attended
 ~33% high school, 66%
 college

~46% woman

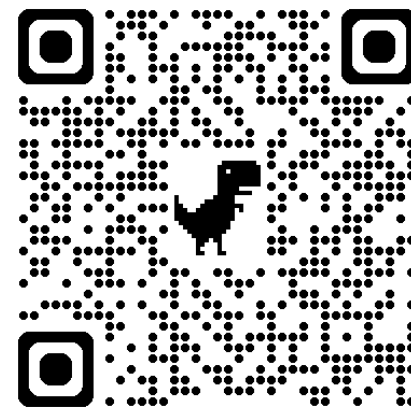
Pre conference survey +
 Conference + Post
 Conference Survey (N=32)

Survey Item	Pre-Survey Mean (SD)	Post-Survey Mean (SD)	Effect size Cohen's <i>d</i>
1. Learning about physics topics is interesting and engaging.	4.78 (0.42)	4.84 (0.37)	
2. Learning about physics changes my ideas about how the world works.	4.69 (0.47)	4.81 (0.47)	
3. It is possible to explain physics without mathematical formulas.**	3.50 (0.92)	3.97 (0.97)	0.51 ^b
4. To understand physics, I sometimes think about my personal experiences and relate them to the topic being analyzed.*	3.53 (1.22)	3.97 (1.00)	0.48 ^b
5. I enjoy being part of a physics network with like-minded peers.***	4.13 (0.71)	4.56 (0.62)	0.65 ^b
6. I enjoy learning about current events that involve physics.*	4.29 (0.74)	4.61 (0.56)	0.43 ^a
7. Physics careers are only for the academically brilliant.	3.77 (0.88)	3.32 (1.14)	
8. Knowing physics will give me a career advantage.	4.35 (0.71)	4.58 (0.56)	
9. I am confident I can learn physics skills.	4.55 (0.57)	4.58 (0.56)	
10. I am curious about discoveries in physics.	4.61 (0.56)	4.68 (0.54)	
11. I will use physics problem solving skills in my career.	4.64 (0.49)	4.77 (0.56)	
12. Reasoning skills used to understand physics can be helpful in my everyday life.**	4.45 (0.62)	4.77 (0.43)	0.54 ^b
13. I know what science, mathematics, and technology courses that will prepare me for physics careers.**	4.06 (0.93)	4.61 (0.56)	0.59 ^b
14. I am interested in reading articles and/or watching documentaries about physics.***	3.97 (0.91)	4.58 (0.56)	0.70 ^b
15. I am familiar with different types of physics careers.***	3.45 (0.93)	4.32 (0.75)	0.98 ^c
16. I believe I can master physics knowledge and skills.**	4.19 (0.70)	4.55 (0.57)	0.54 ^b
17. Physics will be part of my future after high school/college.	4.51 (0.68)	4.61 (0.62)	
18. Nearly everyone is capable of understanding physics if they work at it.	4.45 (0.57)	4.45 (0.62)	
19. In physics, mathematics expresses meaningful relationships among measurable quantities.	4.45 (0.62)	4.64 (0.55)	
20. I want to learn more about physics.	4.71 (0.46)	4.71 (0.46)	
21. I can see myself pursuing a physics-related career after college.	4.45 (0.85)	4.64 (0.55)	
22. I am not satisfied until I understand why something works the way it does.*	4.26 (0.68)	4.54 (0.62)	0.42 ^a
23. I do not expect equations to help my understanding of physics; they are just for doing calculations.	3.83 (1.00)	3.67 (1.38)	
24. Learning physics will help me get a good job.*	4.06 (0.77)	4.38 (0.67)	0.43 ^a
25. I am interested in pursuing a physics-related major in college.	4.45 (0.89)	4.42 (0.89)	
26. Physics experiments contribute to the growth of scientific knowledge.	4.77 (0.50)	4.81 (0.40)	
27. I can communicate physics concepts to people who have little or no background in the subject.	3.90 (0.79)	4.00 (0.73)	
28. Communicating scientific results to peers is a valuable part of doing physics experiments.	4.51 (0.63)	4.64 (0.49)	
29. If I wanted to, I think I could be good at doing physics research.	4.48 (0.63)	4.58 (0.50)	
30. I feel respected as a physics person/someone who can excel in physics courses by my peers and teachers/instructors.**	4.13 (0.81)	4.48 (0.63)	0.58 ^b
Overall Composite***	127.84 (9.76)	134.06 (9.19)	0.86^c

* $p < .05$; ** $p < .01$; *** $p < .001$; *a*=small effect; *b*=medium effect; *c*=large effect



- Cosmic Pathways II will happen in November 2026. We are looking for Team Members.
- We are Looking to build Cosmic Pathways in your neck of the woods. We want this conference to pop up all over the country. Let me know if you are interested.
- I am also doing Be a Shark workshops for Colleges and Organizations. Let me know if you are interested.
- Contact: mwright@adelphi.edu
<https://cosmicpathways.org/>



Be A Shark 8/15/25

