

# Public Education and Outreach Activities Update

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On behalf of the Snowmass Public Education & Outreach Topical Group

2021 Meeting of the Division of Particles and Fields of the American Physical Society (DPF2021)

Virtual Event

Florida State University

12-14 July 2021

# Thank you DPF21 organizers & participants!

Spotlight on DPF Member Public Education and Engagement

See [cern.ch/ColliderScope](http://cern.ch/ColliderScope) for more info

Collider-inspired electronic music  
Best viewed on an **oscilloscope**

A project by Lawrence Lee (Harvard, Tennessee)  
Production assistance from Tova Holmes (Tennessee)

## Spotlight on DPF Member Public Education and Engagement

[Daniel Whiteson, UC Irvine, experimental particle physicist on ATLAS](#)

Preschool science show on PBS, 2020 [pbskids.org/elinor](http://pbskids.org/elinor)

Popular science book, '17 [wehavenoidea.com](http://wehavenoidea.com)

Physics podcast on iHeartRadio, 2018- [danielandjorge.com](http://danielandjorge.com)

Popular science Book, 2021 [universefaq.com](http://universefaq.com)

Highest rated new show on PBSKIDS! Renewed for 2nd

Translated into 24 languages

300+ episodes 15M downloads

9+ translations in progress!

## Spotlight on DPF Member Public Education and Engagement

[thisblacklight.com](http://thisblacklight.com) : Co-curated by Brian Nord, Lauren Biron, Renée Hložek and Lucianne Walkowicz

BlackLight provides resources to help you become more familiar with the Black Experience in the United States. These activities cover a wide range — conversations amongst friends, watching videos, listening to radio and podcasts, listening to key voices on social media. In just an hour each day, or a day each week, you can engage in these activities to help you think about and reflect on your role and understanding of the Black Experience in America.

[discriminology.org](http://discriminology.org)

"The Ideal of America" - Nikole Hannah-Jones

"The Case for Reparations" - Ta-Nehisi Coates

"How Segregation Caused your Traffic Jam" - Kevin M. Kruse

"A Report from Occupied Territory" - James Baldwin

"Black Girl Walking" - Hope Wabuke

"Learning from the 60s" - Audre Lorde

"A Dream Still Deferred" - Thomas Sugrue

"Beyond Hidden Figures" - New York Times

"The Intersectionality Wars" - Jane Coaston

## RESOURCES

Physics Cakes

Katharine Leney  
Kathryn Grimm

Feynman Diagram Cookies

LGBTQ STEM Day

Dark Matter Cake

... an anatomically correct model of the universe masquerading as a cake

Visible matter (4.9%) + Dark energy (68.3%) + Dark matter (26.8%) = The universe

Image: David Morse

# U.S. Strategic Planning Process for Particle Physics

Adopted from Young-Kee Kim's presentation at this week's  
African Strategy on Fundamental and Applied Physics  
Community Town Hall Meeting

Community-Driven Science Study, a.k.a. "***Snowmass***" (1.5 year-long process)  
Define the most important questions for the field &  
Identify promising opportunities to address them

Organized by Division of Particles and Fields (DPF) of American Physical Society

## **Particle Physics is global:**

The Snowmass process involves communities and plans from other regions

## **Particle Physics is not isolated:**

Snowmass process includes related communities

Long-Range Plan for Nuclear Science (neutrinos, fundamental symmetry, QCD, ...)  
Decadal Survey on Astronomy and Astrophysics (dark energy, CMB, dark matter, ...)  
Accelerator R&D Subpanel Report

# Frontiers and Topical Groups

30 Frontier conveners + ~250 Topical Group conveners + >40 inter-frontier liaisons + ~25 early career liaisons

10 Frontiers	80 Topical Groups
Energy Frontier	Higgs Boson properties and couplings, Higgs Boson as a portal to new physics, Heavy flavor and top quark physics, EW Precision Phys. & constraining new phys., Precision QCD, Hadronic structure and forward QCD, Heavy Ions, Model specific explorations, More general explorations, Dark Matter at colliders
Frontiers in Neutrino Physics	Neutrino Oscillations, Sterile Neutrinos, Beyond the SM, Neutrinos from Natural Sources, Neutrino Properties, Neutrino Cross Sections, Nuclear Safeguards and Other Applications, Theory of Neutrino Physics, Artificial Neutrino Sources, Neutrino Detectors
Frontiers in Rare Processes & Precision Measurements	Weak Decays of b and c, Strange and Light Quarks, Fundamental Physics and Small Experiments. Baryon and Lepton Number Violation, Charged Lepton Flavor Violation, Dark Sector at Low Energies, Hadron spectroscopy
Cosmic Frontier	Dark Matter: Particle-like, Dark Matter: Wave-like, Dark Matter: Cosmic Probes, Dark Energy & Cosmic Acceleration: The Modern Universe, Dark Energy & Cosmic Acceleration: Cosmic Dawn & Before, Dark Energy & Cosmic Acceleration: Complementarity of Probes and New Facilities
Theory Frontier	String theory, quantum gravity, black holes, Effective field theory techniques, CFT and formal QFT, Scattering amplitudes, Lattice gauge theory, Theory techniques for precision physics, Collider phenomenology, BSM model building, Astro-particle physics and cosmology, Quantum information science, Theory of Neutrino Physics
Accelerator Frontier	Beam Physics and Accelerator Education, Accelerators for Neutrinos, Accelerators for Electroweak and Higgs Physics, Multi-TeV Colliders, Accelerators for Physics Beyond Colliders & Rare Processes, Advanced Accelerator Concepts, Accelerator Technology R&D: RF, Magnets, Targets/Sources
Instrumentation Frontier	Quantum Sensors, Photon Detectors, Solid State Detectors & Tracking, Trigger and DAQ, Micro Pattern Gas Detectors, Calorimetry, Electronics/ASICS, Noble Elements, Cross Cutting and System Integration, Radio Detection
Computational Frontier	Experimental Algorithm Parallelization, Theoretical Calculations and Simulation, Machine Learning, Storage and processing resource access (Facility and Infrastructure R&D), End user analysis
Underground Facilities and Infrastructure Frontier	Underground Facilities for Neutrinos, Underground Facilities for Cosmic Frontier, Underground Detectors
Community Engagement Frontier	Applications & Industry, Career Pipeline & Development, Diversity & Inclusion, Physics Education, Public Education & Outreach, Public Policy & Government Engagement, Environmental and Societal Impacts

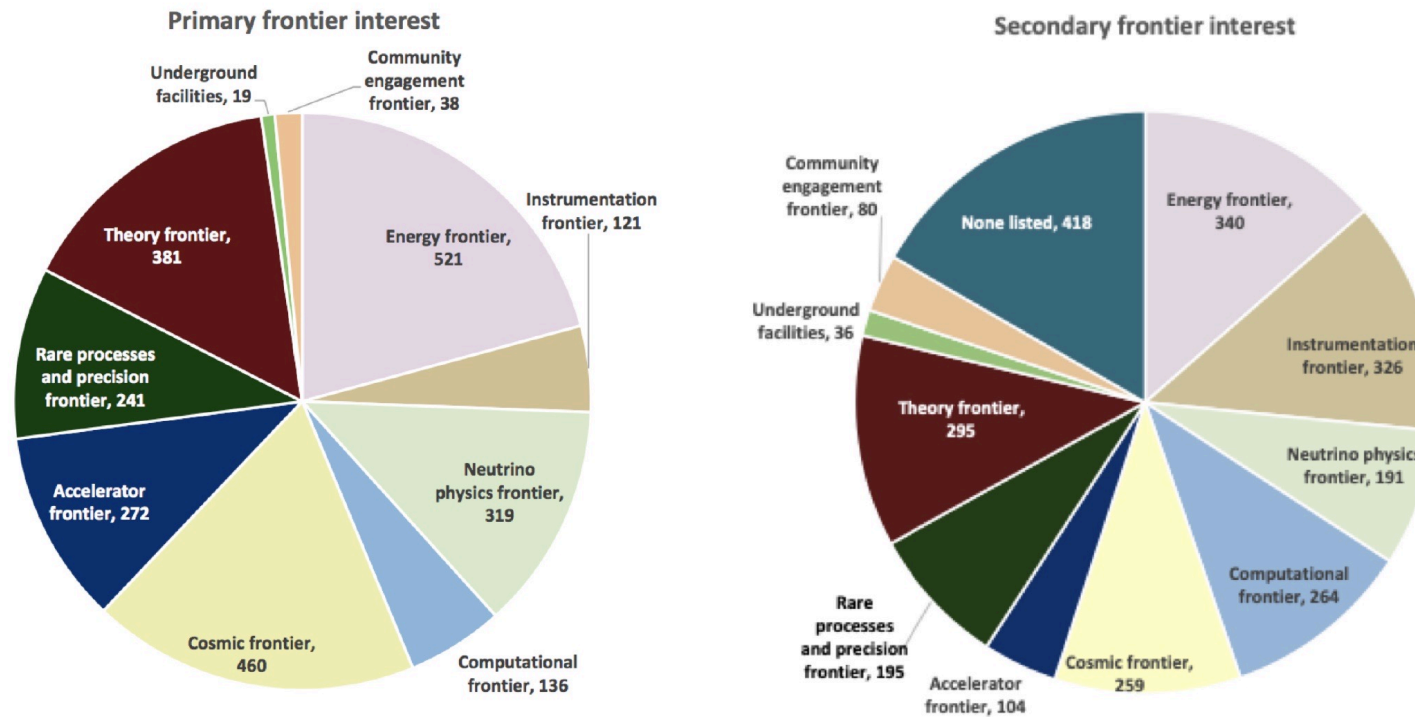
# Snowmass Community Planning Meeting

~3,000 participants (virtual)

~650 outside the North America Time Zone

(Note that 11am-4pm U.S. Central time was inconvenient – very inconvenient for many countries)

1,574 in total: submitted before August 31, 2020 (many LOIs – multiple frontiers)



July 12, 2021

ASFAP Community Town Hall: USA Physics Strategies, Young-Kee Kim (U.Chicago)

# Community Engagement Forum

As presented at Snowmass21 Community Planning Meeting by Ketevi Assamagan

## CEF Topical Group (TG) Convenors & Liaisons to other Frontiers

### Applications & Industry (20 LOIs)



Farah Fahim  
Fermilab  
farah@fnal.gov



Alex Murokh  
Radiabeam  
murokh@radiabeam.com



Koji Yoshimura  
Okayama

~100 LOIs  
(several overlapping)

### Diversity and Inclusion (33 LOIs)



Carla Bonifazi  
(Univ. Fed. do Rio de Janeiro)



Mu Chun Chen  
(UC Irvine)



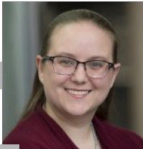
Samuel Meehan  
(CERN)

Johan Sebastian Bonilla and Yi-Hsuan Lin replaced Sam Meehan

### Career Pipeline & Development (31 LOIs)

#### Liaisons:

Claire Lee, Devin G. Walker, Farah Fahim, Jeroen van Tilborg, Mateus Carneiro, Sergei Gleyzer, Sijbrand de Jong, and Sophie Middleton, David Bruhwiler



Julie Hogan  
Bethel University  
j-hogan@bethel.edu



Amr El-Zant  
British University in Egypt  
Amr.Elzant@bue.edu.eg



## CEF Convenors

Breese Quinn  
(Mississippi)

Kétévi Assamagan  
(BNL)



### Physics Education (31 LOIs)



Randy Ruchti  
Notre Dame  
rruchti@nd.edu



Sudhir Malik  
UPRM  
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Sijbrand de Jong  
Radboud University  
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### Public Education and Outreach (16 LOIs)



Sarah Demers  
Yale University  
sarah.demers@yale.edu



Kathryn Jepsen  
Symmetry Magazine  
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Don Lincoln  
FNAL  
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### Public Policy and Government Engagement (10 LOIs)



Rob Fine  
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Louise Suter  
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Brajesh Choudhary  
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# Public Education and Outreach Topical Group



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## **Overall Objective:**

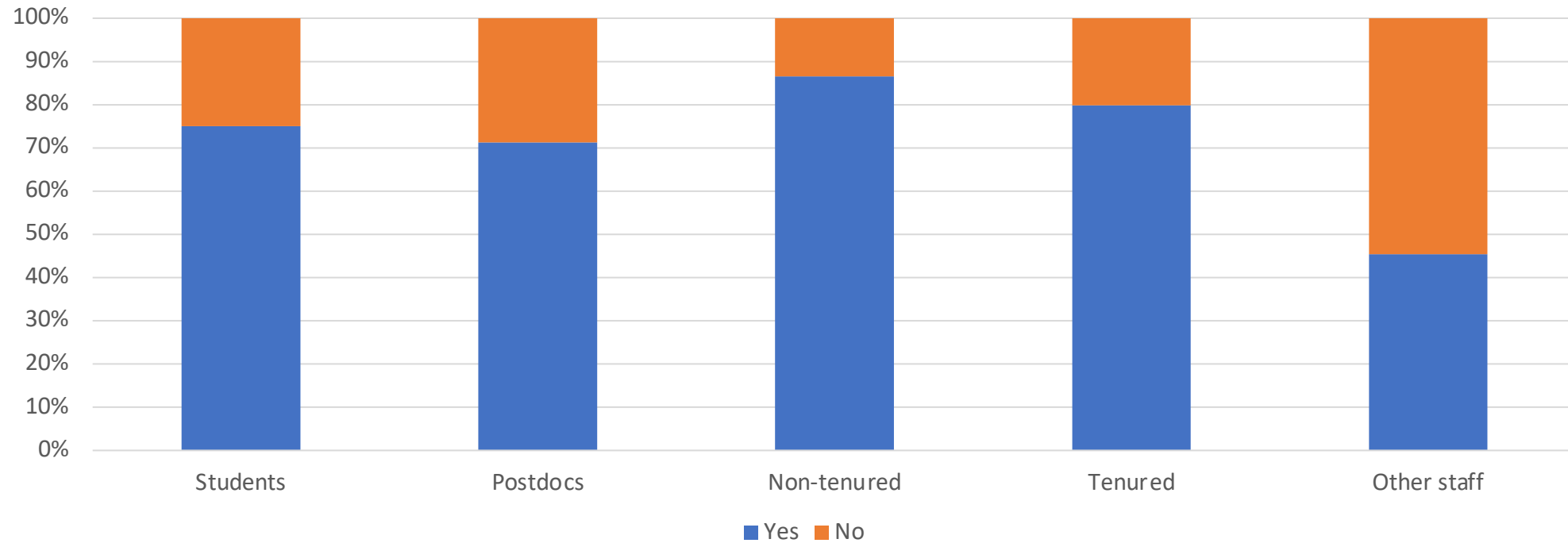
- To facilitate discussions amongst HEPP community and its stakeholders on the transformative public engagement and education strategies

## **Overall Goals:**

- To have public engagement and education in particle physics recognized as important scientific activities and supported at all levels.
- To have public engagement and education as part of every practicing particle physicist's job description and to be recognized at all levels.

# From Public Education & Outreach Survey at Snowmass CPM

Have you participated in engagement in the last 2 years?





# Roadblocks mentioned

- Not enough time
- Not enough benefit in career/funding opportunities
- Not easy to access resources or opportunities
- Not enough training
- Challenging to communicate null or incremental results
- COVID restrictions

# Sampling of advice on getting started

- Start small and look for simple opportunities that are easy to engage with and grow from there.
- Start from giving talks at local communities, such as libraries, schools etc. or taking students to your lab and talk to them about what you do in science and why you are passionate about it.
- Reach out to established science outreach opportunities in your area, even if they aren't devoted to physics; it is much easier to build on an established program.
- Don't be afraid to ask for help or guidance

# Letters of interest to E&O

- Early Career and Community Engagement
- Education and Outreach to under-represented communities
- Science communication amongst all stakeholders
- Facilitating access to HEP data for educational purposes
- CREDO-Maze: Multi-stage Global Network of school EAS Mini-arrays (“the quest for the unexpected)
- The Cosmic Ray Extremely Distributed Observatory as a new quality public engagement and edutainment environment
- Progress in High School Physics Outreach
- Expanding FNAL’s international outreach reach through European Networks/ International Collaborations
- The African School of Fundamental Physics and Applications (ASP)
- Expanding to non-traditional outlets (art/sci, music festivals, etc)
- The CERN-IARI Project and New Opportunities for Integrated Arts Research Collaborations at Universities and National Laboratories
- Structural changes for public engagement with particle physics and particle physics communication
- Ensuring the conditions that encourage effective participation in public engagement

# Emerging themes from Lols

- **Social Justice.**
  - How can public education and outreach promote D&I?
- **What HEP resources are needed for us to do HEP Public Engagement and Education?**

Databases, curriculum, detectors... Invite groups from Quarknet, CREDO, etc. to a meeting together to make sure that we're working well together and form a working group.
- **International intent, connections with gov+public policy (visas, etc) and public education engagement with HEP.**

Focused toward elevating US engagement with developing countries and international community at large  
Public Education and International Partnerships
- **Festivals, Music/Arts & Physics...**
  - HEP meets Art, story telling, ...

# Emerging themes from Lols

- **Ensuring the conditions that encourage effective participation in public engagement**

- Training, resources, rewards and incentives

- **Structural changes for public engagement with particle physics**

This will require structural changes at the levels of:

1. The physics department, in a unit or division within an organization such as a national lab or a society such as DPF.
2. The faculty/college/school--in collaboration with other divisions, if applicable.
3. The university/college--in collaboration with other fields, if applicable.
4. The governmental level, whether it be creating new partnerships with educators at the level of the local Department of Education, or recognizing public engagement and science communication in federal grant processes.

# Our ongoing Snowmass activities

Dear DPF21 participants,

The Public Education and Outreach/Engagement group is starting to come out of our Snowmass pause and we wanted to let you know that our regular meetings have started up. For now, we're meeting every-other Tuesday afternoon at 4pm Eastern time. Our meetings are open and everyone is welcome! Here is the link to our activities calendar:

<https://snowmass21.org/community/start>

If you would like to take part in our discussions please contact the conveners for further details.

Best regards,  
Azwinndini (also on behalf of Sarah, Kathryn and Don)

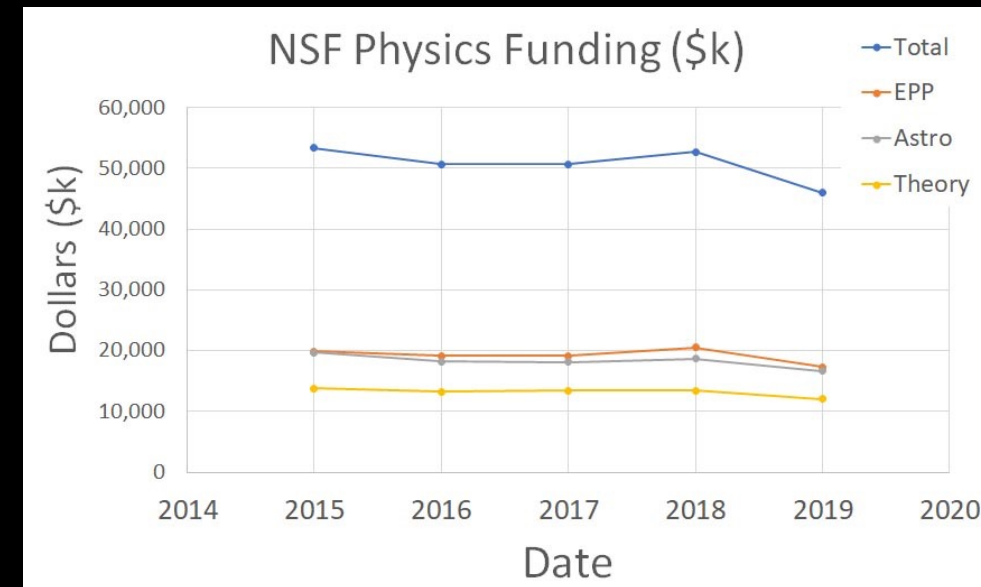
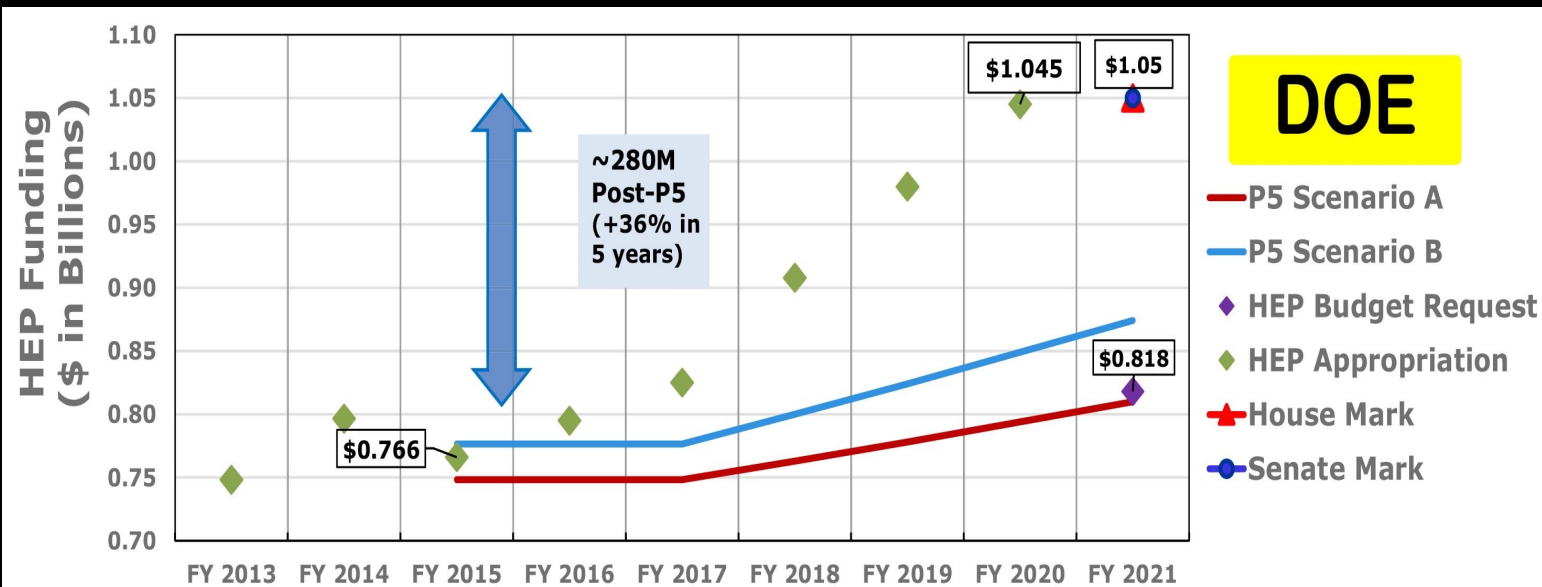
# Why Public Education and Outreach matter?

Please see and listen to Don Lincoln plenary presentation

Here I will be focusing on the “why?” slides from Don’s presentation

# So why do outreach? (#1)

- Basically, because everyone watching this topic is funded with federal money.
- It is imperative that we continue to advocate for ongoing funding, or our work stops.
- We get \$1.05 billion from DOE and about \$50 million from NSF.
- There is at least one audience we need to take seriously (policy makers).





# So why do outreach? (#2)

- Science enthusiasts. These are our allies. They will help contact Congress and advocate for science.
- First, we must feed their interests
- Second, we need to motivate them to contact Congress.



I VOTE  
PRO SCIENCE



# So why do outreach? (#3)

- Science denialists. If we don't engage with them, or at least add a different voice to the conversation, all we'll have are science denialists talking. And that does none of us any good.



livescience

TECH HEALTH PLANET EARTH SPACE STRA

TRENDING: Wearable Tech // Archaeology // Military & Spy Tech // Zika virus // OurAmazingPlanet

## Will the Large Hadron Collider Destroy Earth?

by Clara Moskowitz | October 26, 2012 06:11pm ET

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Share

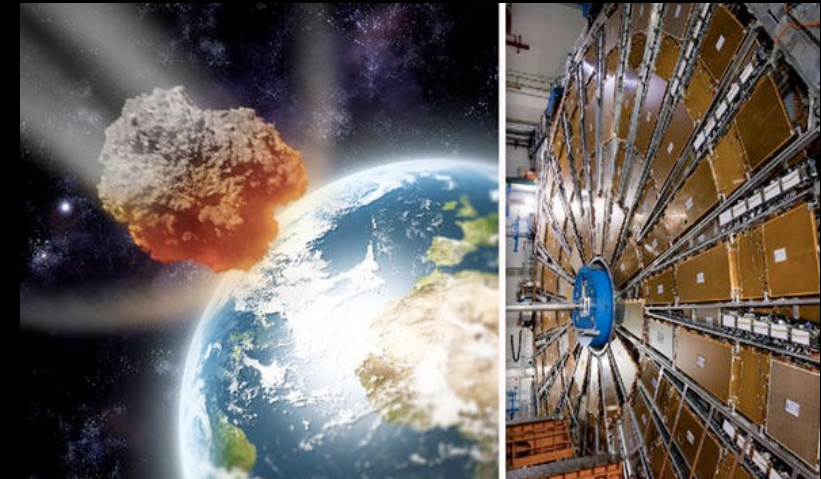
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Tweet

in cooperation with Life's Little Mysteries



LARGE HADRON COLLIDER



Collider magnetic field could pull asteroids towards Earth

- The images here are HEP-specific, but there is also covid, vaccines, 5G, climate change, cell phone worries, acid rain, UFO mania, etc.
- We have to speak up!!

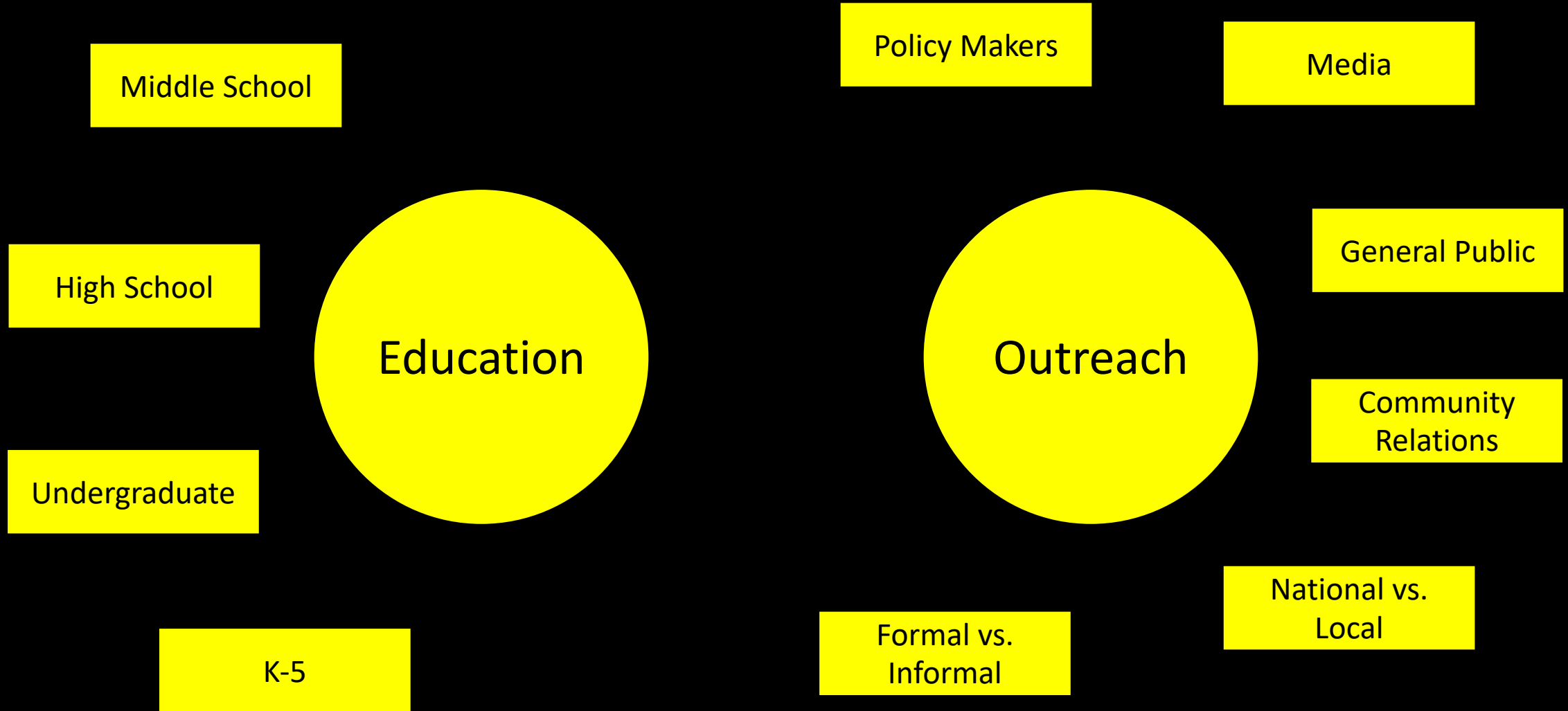
# So why do outreach? (#4)

- Kids! They are our future. They need to be scientifically savvy, or at least scientifically friendly
- Underrepresented groups. The broader we recruit, the smarter the field becomes. White guys don't have a monopoly on brains.



**Kids Love Science**

# So, you want to do outreach. What kind?





# In summary

- HEP community will benefit from Public Education and Outreach activities through
  - transformative cultural changes
  - transformative structural changes
  - conducive environment
  - recognition of excellence
- It is in each and everyone of us to make it happen
  - From the individual researcher/faculty/student/lab technician/engineer
  - To physics research group, department, school, college, university, national lab
  - To local, state and federal government
- **It is in *our* hands!**