

# Colliders of Tomorrow

Strengthening Communication,  
Advocacy, and Planning for Future  
Advancements in US Particle Physics

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Particle Physics

You are Here

Astrophysics

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# The Energy Frontier Early Career Community

**Without fail, everyone from the EF Early Career Community endorses the plan laid out in the EF Snowmass Report:**

**For the five year period starting in 2025:**

1. Prioritize the HL-LHC physics program, including auxiliary experiments,
2. Establish a targeted  $e^+e^-$  Higgs factory detector R&D program,
3. Develop an initial design for a first stage TeV-scale Muon Collider in the US,
4. Support critical detector R&D towards EF multi-TeV colliders.

**For the five year period starting in 2030:**

1. Continue strong support for the HL-LHC physics program,
2. Support construction of an  $e^+e^-$  Higgs factory,
3. Demonstrate principal risk mitigation for a first stage TeV-scale Muon Collider.

**Plan after 2035:**

1. Continuing support of the HL-LHC physics program to the conclusion of archival measurements,
2. Support completing construction and establishing the physics program of the Higgs factory,
3. Demonstrate readiness to construct a first-stage TeV-scale Muon Collider,
4. Ramp up funding support for detector R&D for energy frontier multi-TeV colliders.

**We also ALL realize that these are difficult goals to achieve!**

***We, the community, must do our part*** <sup>2</sup>

# Expanding Access to Particle Physics

The Science is exciting(!!) and the public wants to engage with us; it is our duty to engage with them!

What is needed to further this?

- Funding awards to engage with museums, festivals, schools (\$10k goes a long way)
- Dedicated staff at DOE and labs to interact with **K-12 teachers, school boards** and **textbook manufacturers** to create curriculum for kids
- Encourage (Reward) Engagement at the Base Grant funding level



## BIG BANG SCIENCE FAIR

WaterFire Providence  
September 28, 2019

**4 - 10 PM RISD Auditorium**  
Inspiring lectures (ages 10 and up - get your free ticket via EventBrite for priority seating)  
Derek Muller (legend of Youtube channel Veritasium with 650M views): How Do We Figure Out What's True?  
Dorit Chrysler (composer) demonstrates the Theremin  
Prof. John Donoghue (Brown University): Merging Man and Machine to Help People with Paralysis  
Rebecca Thompson (Fermilab): Fire, Ice, and Physics: The Science of Game of Thrones  
Jazz performance to the themes of "God Particle" (Prof. Stephon Alexander, Melvin Gibbs and friends)  
Event emcee: Dr. Don Lincoln (author and particle physicist, Fermilab)

**4 - 10 PM Workshops**  
(limited seating, reserve via EventBrite)  
"HANDS OFF" - How to play the Theremin  
Music Programming with Microsoft Philanthropies TEALS program  
See cosmic rain using a fish tank

**5 - 10 PM Market Square and College Street**  
Exciting walk-up activities (all ages)  
Stargaze with local astronomers  
Blend science with art with RIMOSA  
Explore the wonders of the brain  
See cool chemistry experiments and spectacular physics demos  
Experience virtual reality and computer science in action  
Learn about medicine and science  
Take a selfie in the tunnel of the Large Hadron Collider  
Discover the science of cooking  
Get a hug from the Brown Bear

**6 - 8 PM Math Open House at ICERM**  
(free ticket required - reserve via EventBrite)  
Featuring in-residence "Math+Art" artists and their work

And many more demonstrations illustrating the wonders of science  
See website for program: <https://waterfire.org/2019-big-bang-science-fair-at-waterfire-providence/>  
Contacts: Dr. Gelonia Dent, Prof. Meenakshi Narain, Prof. Ulrich Heintz (Brown U) - meenakshi\_narain@brown.edu

Lead Sponsors: BROWN BROWN PHYSICIANS, INC. WATERFIRE PROVIDENCE

We also acknowledge support from other sponsors and individuals

# Be Prepared to Seize Funding Opportunities

The US Particle Physics Community has agreed to follow the direction of P5

Obviously, we are currently limited by funding

- The DOE is not allowed to advocate for new projects and initiatives - that is the job of the community!
- But, P5 can endorse future collider scenarios so that the Early Career community of today can start the **campaign** and advocacy effort

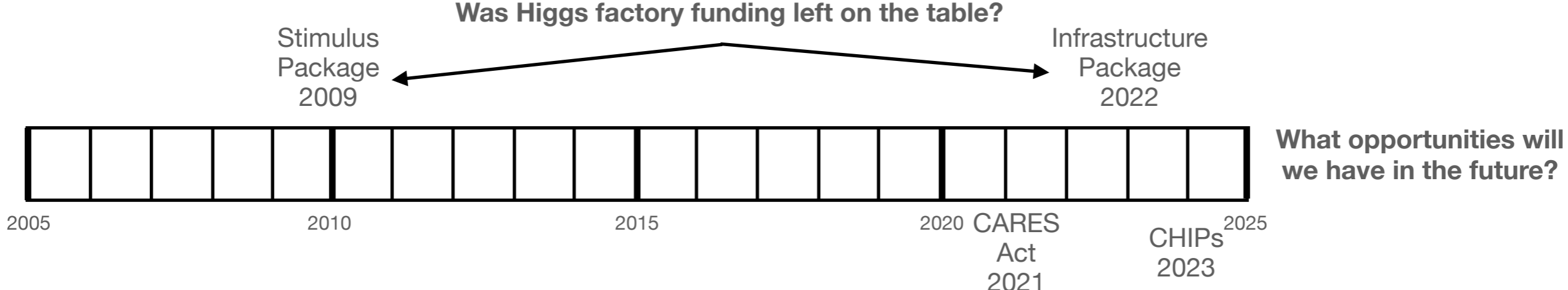


a model organization for science advocacy

- The EC community is **excited to campaign for future colliders!** (Particularly ones based in the US)

Our field should be prepared with shovel ready projects

- Seize funding opportunities when they arise



# Future Collider Decision Matrix

Encourage creation of an extra-governmental future collider organizing body

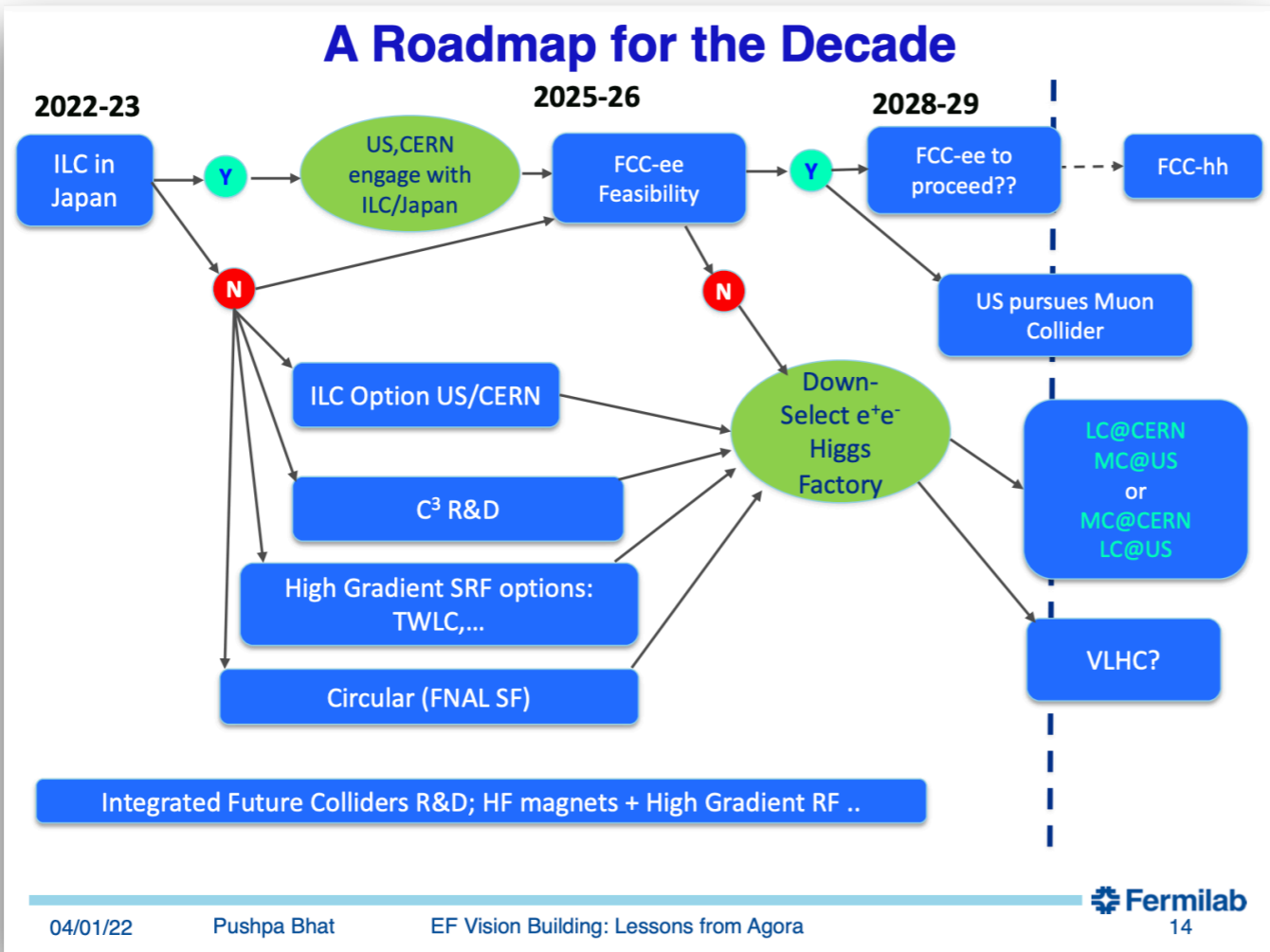
Create a future collider decision matrix (example below)

- Plan for the migration of the community to other efforts as timelines evolve

Prioritize directed R&D funding for future collider demonstrator

Encourage widespread community interaction with future collider initiatives

- Encourage work on broader impacts, including future colliders and DEI, in base grant funding reviews



Example Roadmap  
From Pushpa Bhat  
Energy Frontier Workshop  
[link](#)

# Going forward

**The community should endorse the P5 strategy but we should not confine ourselves to two funding scenarios when we know that the future will change**

**We would like to start campaigning for future colliders**

- Start with good Science
- Increase public outreach
- Continue with advocacy efforts (this is better with P5 or NAS endorsement)

**The Energy Frontier Early Career Community is happy to send a final letter on US-based projects**

As young energy frontier scientists, we stand united in our support for compact and power-efficient options for future colliders. We ask P5 to advocate for a robust national collider R&D program [1,8], and for C3 and Muon Collider R&D in particular.

Sincerely,  
Early Career Scientists

[Link to Energy Frontier Early Career Letter on C<sup>3</sup> and MuC](#)  
~150 Signatures

