HFCC-A
Early Career Discussion

Kellen McGee, FNAL and Spencer Gessner, SLAC

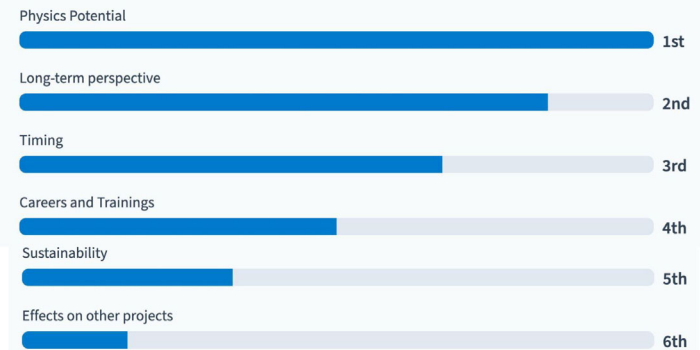# Early Career Session held at SLAC HFCC PED Meeting in December

Early Career Inputs to the Future Collider Discussion

Rocky Bala Garg, Josh Bendavid, Saptaparna Bhattacharya, Viviana Cavaliere, Loukas Gouskos, Caterina Vernieri

What matters most in terms of a future collider facility (You can select more than one option)

Physics Potential	1st
Long-term perspective	2nd
Timing	3rd
Careers and Trainings	4th
Sustainability	5th
Effects on other projects	6th

Do you think the global particle physics community should focus on one flagship collider at a time or pursue multiple smaller projects in parallel?

One flagship collider	47%
Multiple smaller projects	0%
Combination of both	53%

**I am willing to support the outcome of the strategy process, even if my favorite future collider option is not chosen as first priority.**

Agree	71%
Somewhat Agree	18%
Not agree at all	12%
I don't care	0%
None of the above	0%
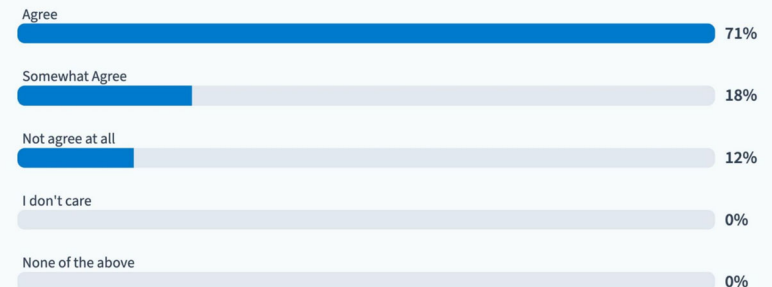
https://indico.slac.stanford.edu/event/9297/contributions/11267/attachments/4990/13318/SLAC%20EC%20FCCee%20Presentation_withResults.pdf

Early Career Session held at ECFA Higgs Meeting in October
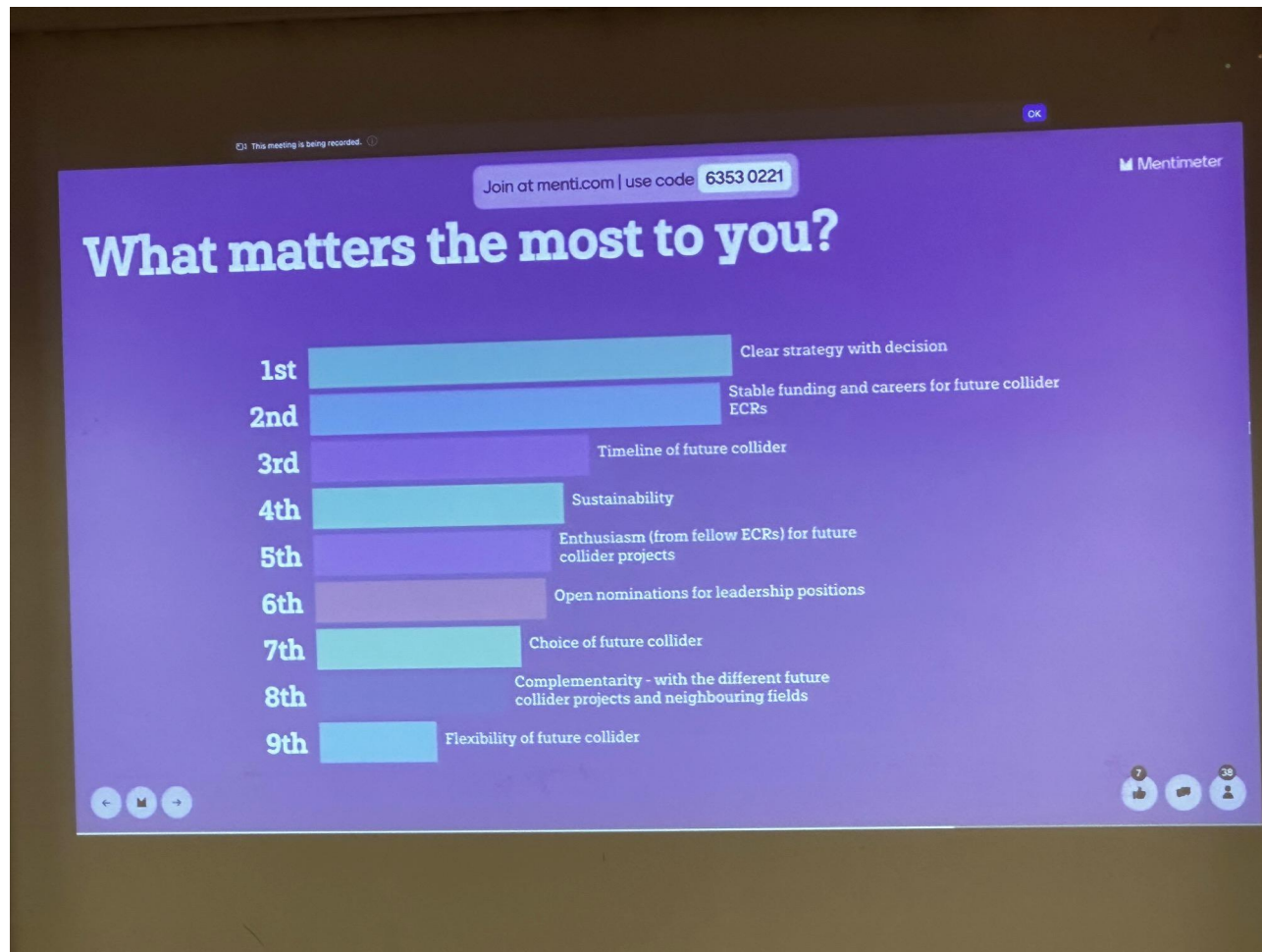
We want to hear from the US HEP Community on the ESG Questions

US HFCC Community Input on Future Colliders to ESG

Dear Early Career Members (and everyone else),

DOE and NSF have requested that the US Higgs Factory Consortium Collaboration (HFCC) generate a white paper, in consultation with the U.S. community, for the update of the European Strategy on Particle Physics (ESPP). The P5 Report recommends support for an off-shore Higgs Factory and, since the report's release, the US government has started implementing elements of that plan. This includes the formation of the US HFCC for Physics, Experiments, and Detectors (PED) and Accelerators (ACC), as well as a Statement of Intent between the US and CERN.

The HFCC white paper will discuss strategy and possible US technical contributions to an off-shore Higgs Factory. We plan to collect community input and comments to help us craft a coherent and focused statement for the European Strategy Update. Recognizing that an off-shore Higgs Factory will be run and operated by the next generation of physicists, we wish to take particular care to solicit and incorporate the views of early-career researchers in this statement.
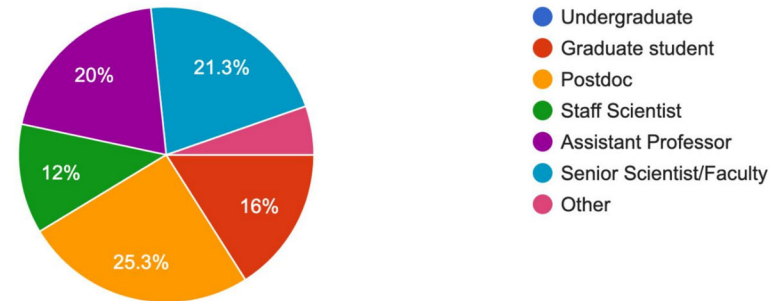
The questions in the survey below directly reflect the questions posed by the ESPP European Strategy Group (ESG) to the HFCC. We invite you to provide us with your own answers to these questions; **please review the US HFCC Input to HEPAP before filling out the survey (in particular slide 12 of the presentation).** Sections 20-24 of "FCC-ee: Your Questions Answered" provides useful information on CERN's proposed strategy. There is a question on Early Career Researcher priorities, similar to a question asked of ECRs at the recent ECFA Higgs Factory Workshop.

Finally, there is an open field to express additional thoughts and questions. Well-reasoned, quantitative input is most helpful for drafting the HFCC white paper. This field can also be used to suggest further topics for discussion in the ECR sessions planned at upcoming HFCC meetings.

We appreciate your input.

- The HFCC Editorial Board

Position
75 responses

- Undergraduate
- Graduate student
- Postdoc
- Staff Scientist
- Assistant Professor
- Senior Scientist/Faculty
- Other

21.3%
16%
25.3%
12%
20%

https://forms.gle/kK3c8Gj7aFSkPzFv6

Resources for Early Career Accelerator Physicists

Winter 2025 USPAS Session

University Sponsor:
Michigan State University

Location & Dates:
Knoxville, Tennessee, USA
January 27 - February 7, 2025

Week one: January 27 - 31, 2025

- Project Management for Scientists and Engineers
  Instructors: Kem Robinson, Lawrence Berkeley National Lab Emeritus; Michael Geelhoed, Fermilab; Kasey Lund, Nusano
  This class is full.

- Python Programming and Applications for Accelerator Science and Engineering
  Instructors: Jeff Eldred and Adam Watts, Fermilab
  TA: Brandon Cathey, Oak Ridge National Lab
  This class is full.

- Colliders for High Energy and Nuclear Physics
  Instructors: Vladimir Shiltsev, Northern Illinois University and Vadim Ptitsyn and Chuyu Liu, Brookhaven National Lab
  This class is full.

- Accelerator Power Electronics Engineering
  Instructors: James Sebek, SLAC National Accelerator Lab; Paul Bellomo, ret. SLAC National Accelerator Lab (remote); Yugang Tan, Oak Ridge National Lab
  TA: Jared Walden, SNS Oak Ridge National Lab
  This class is full.

- Superconducting Accelerator Magnets
  Instructors: Paolo Ferracin, Maxim Marchevsky and Soren Prestemon, Lawrence Berkeley National Lab; Ezio Todesco, CERN (remote)
  TAs: Marek Mosat and Yufan Yan, Lawrence Berkeley National Lab
  This class is full.

Two-week full courses: January 27 - February 7, 2025

- Fundamentals of Accelerator Physics and Technology with Simulations and Measurements Lab *(undergrad level)*
  Instructors: Simon C. Leemann, Lawrence Berkeley National Lab; Thomas Schietinger, Paul Scherrer Institute; Ryan Lindberg, Argonne National Lab
  TA: Liam Pocher, University of Maryland; John Rogers, National MagLab; John Wieland, Michigan State University
  This class is full.

- Accelerator Physics
  Instructors: S. Alex Bogacz, Jefferson Lab; Geoff Krafft, Old Dominion University and Jefferson Lab; Subashini De Silva, Old Dominion University and Isurumali Neththikumara, Jefferson Lab
  Grader: Cannon Coats, Texas A&M University
  This class is full.

- RF Superconductivity for Particle Accelerators
  Instructors: Sergey Belomestnykh, Fermilab; Silvia Verdu Andres and Paolo Berrutti, Brookhaven National Lab
  TA: Vijay Chouhan, Fermilab
  This class is full.

Week two: February 3 - 7, 2025

- Strategic Management of Research Labs
  Instructors: William Barletta, MIT; Mei Bai, SLAC National Accelerator Lab; Robert Zwaska, Fermilab
  TA: Michael Geelhoed, Fermilab
  This class is full.

- Optimization and Machine Learning for Accelerators
  Instructors: Remi Lehe, Lawrence Berkeley National Lab; Auralee Edelen and Ryan Roussel, SLAC National Accelerator Lab
  Grader: J.P. Gonzalez Aguilera, University of Chicago; River Robles, Stanford University/SLAC
  This class is full.

- Collider Interaction Regions for High Energy and Nuclear Physics Applications
  Instructors: Michael Sullivan, SLAC National Accelerator Lab; Yulia Furletova, Jefferson Lab; Dali Georgobiani, Fermilab; and Nikolai Mokhov, ret. Fermilab (remote)
  This class is full.

- Pulsed Power Engineering
  Instructors: Craig Burkhart, SLAC National Accelerator Lab; William Waldron, Lawrence Berkeley National Lab; Chris C. Jensen, Fermilab
  TA: Jared Walden, SNS Oak Ridge National Lab
  Guest Lecturers: Tony Beukers, SLAC National Accelerator Lab; Chris Pappas, SNS Oak Ridge National Lab (retired); and Jared Walden, SNS Oak Ridge National Lab
  This class is full.

- Cryogenic Engineering
  Instructors: John Weisend, European Spallation Source; Ram Dhuley, Fermilab
  TA: Grzegorz Tatkowski, Fermilab
  This class is full.

Resources for Early Career Accelerator Physicists

- DOE-funded traineeship programs in accelerator science and engineering:
  - Fermilab collaborates with MSU, Stony Brook, ODU, Cornell, NIU
- NSF-funded Center for Bright Beams
  - Cornell, U Chicago, NIU, UCLA, ASU . . .
- Universities that offer courses on accelerator physics
  - Cornell, Stony Brook, ODU, MSU, Indiana University, NIU, Stanford . . .
  - Students have opportunities to do their research with professors involved in accelerator design/ beam physics.
- If grad students come from outside the field of accelerators and beam physics, they still could be involved via their professor's connections with a DOE lab, and the lab can provide mentors. The student could start with a small project to explore a possibility for their PhD project.
- The DOE SCGSR provides support for 1 year for students to do research at DOE labs.

Example of traineeship:

Precedent: US-LARP

- US LHC Accelerator Research Program: BNL, FNAL, LBNL, SLAC
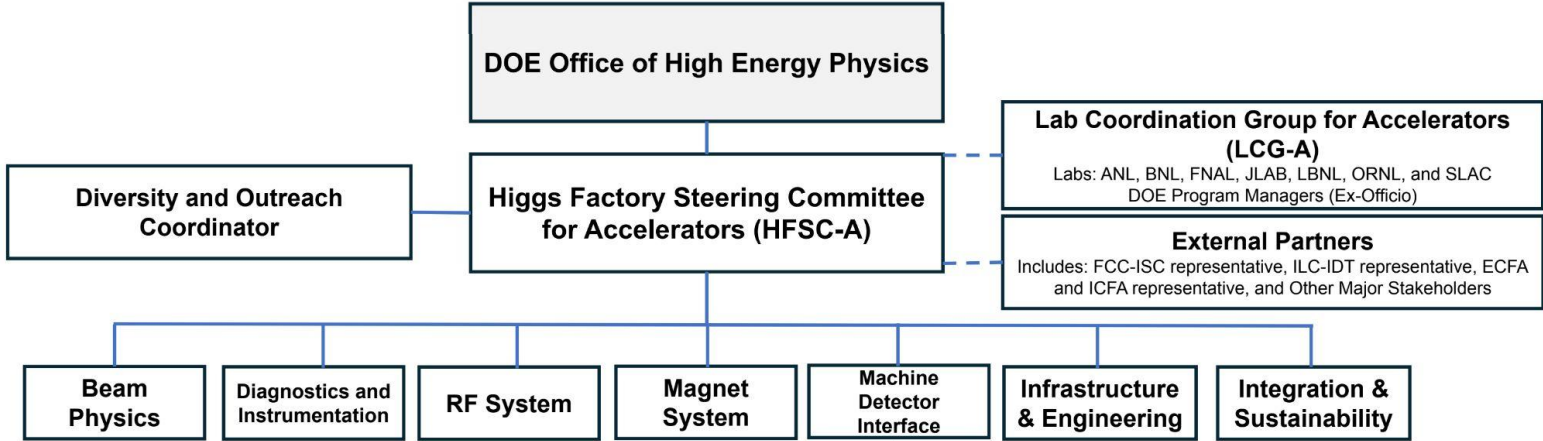 - [LARP](#)
- Toohig Fellowships

Resources for HEP Physicists

- In the early days of particle colliders, there was no distinction between HEP Experimentalist and Accelerator Physicist.
- HEP Experimentalists understand that a new collider will be a massive undertaking, and that the collider comes before the detector!
  - Many HEP Experimentalists are pursuing greater involvement in accelerator R&D (C^3, MC, 10 TeV WFA).
- How can funding agencies facilitate the involvement of HEP Experimentalists with the development of accelerators and colliders?

Goals for Today's Early Career Session

- How can Early Career Researchers get involved with the effort to design a future Higgs Factory and contribute to transformative R&D?
- What can the US HEP field do to support Early Career Researchers in this effort?
  - Development of incentives. New fellowships?
  - Dedicated schools. There used to be an LC School. Maybe an FCC School?
- Assuming a Higgs Factory project is launched, how best can ECs contribute?
  - Many synergistic technologies on the machine side for linear and circular projects
- These projects have a long timescale and are not "guaranteed," what would keep you engaged and feeling secure in your contributions over the decades?

Project Ideas for students associated with the L2s