



U.S. DEPARTMENT OF
ENERGY

Office of
Science

HEP Research Program Status

HEPAP Meeting

December 3, 2020

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DOE Office of High Energy Physics

Outline

- **FY21 Funding Opportunities**
- **Upcoming Reviews**
- **HEP Research Highlights**
 - **Selection of recent and 2020 top results**
- **COVID-19 Impacts on DOE/SC Research**
 - **brief update**
- **Comings and Goings**



Summary of Current DOE/HEP Solicitations

- **On the street now:**
 - “FY 2021 Research Opportunities in High Energy Physics” [DE-FOA-0002424]
 - a.k.a. HEP Comparative Review FOA : LOIs due December 15, 2020; Proposals due January 26, 2021.
 - Primary FOA for HEP research funding. Late schedule will be a challenge for April renewals.
 - “Early Career Research Program” [DE-FOA-0002421]
 - Pre-proposals due November 20, 2020; Proposals due February 16, 2021.
 - This is a Joint FOA/Lab Call (no separate Lab Call)
 - “U.S.-Japan Science and Technology Cooperation Program In High Energy Physics” [LAB 21 2423]
 - Proposals due December 15, 2020. Proposals accepted from lab-led consortia
 - Must have R&D or research collaboration with Japanese institution
 - New this year: Multi-year proposals allowed
 - “FY 2021 Continuation of Solicitation for the Office of Science Financial Assistance Program” [DE-FOA-0002414]
 - Proposals accepted October 1, 2020 – September 30, 2021. Primarily used for conference support, supplemental requests, operations support.
 - Research proposals accepted but have lower funding priority than proposals to Comparative Review.



Summary of DOE/HEP Solicitations (continued)

- **Expected for later this Fiscal Year**
 - “DOE Traineeship In Accelerator Science & Engineering” [DE-FOA-000xxxx]
 - Following prior solicitations in 2017, 2019
 - “Co-Design Microelectronics R&D Centers” [DE-FOA-000xxxx]
 - In FY21 Budget Request. BES lead, general goal is to develop next-generation technologies and materials “beyond Moore’s Law”.
 - HEP is currently a junior partner with specific interest in rad-hard materials and novel technologies
- **Other possible FOAs (funds permitting) include:**
 - “DOE Traineeship In Detector Development”
 - Following model of Accelerator Traineeships but targeted at Detector R&D
 - Noted as essential to success of HEP Detector BRN report goals
 - “AI/ML R&D at High Energy Physics Frontiers”
 - New proposals for targeted topics TBD

Notes on DOE/SC FOAs

Applicants should note some specific changes to DOE/SC FOAs for FY2021. As always, please read the FOA carefully for details of specific requirements and consult the FAQ for common questions.

Biosketches and Current & Pending Support:

- Applicants must use the NSF-approved formats available from Science Experts Network Curriculum Vita (SciENCv).
- Part of an effort to reduce administrative burden by standardizing forms across agencies.
- The new format is machine readable and (in future) searchable within the PAMS database.
- All foreign government-sponsored talent recruitment programs must be identified in Current and Pending support.

Reporting requirements

- DOE is implementing (as-yet unspecified) enhanced reporting requirements for applications and awards.
- Changes may be implemented before the award date or upon award modification (continuation, renewal, etc.)

Early Career Research Program

- Eligibility extensions for “major life events”. See FOA and FAQ for details.
- Lab proposals will respond to the same ECRP FOA as university proposals and will be submitted through grants.gov

Also note that DOE Orders (such as Foreign Visits and Assignments) do NOT generally apply to DOE/SC grants, unless specifically included in the terms of the award.



HEP Research Reviews in ~~2020~~

- ▶ Many reviews ~~are~~ ~~were~~ scheduled in FY 2020!
- ▶ This table shows some highlights, but ~~does not include~~ many of the “usual” activities (eg Comparative Review) or Project (OPA) Reviews. ~~Moved later in 2020;~~ ~~rescheduled for 2021~~

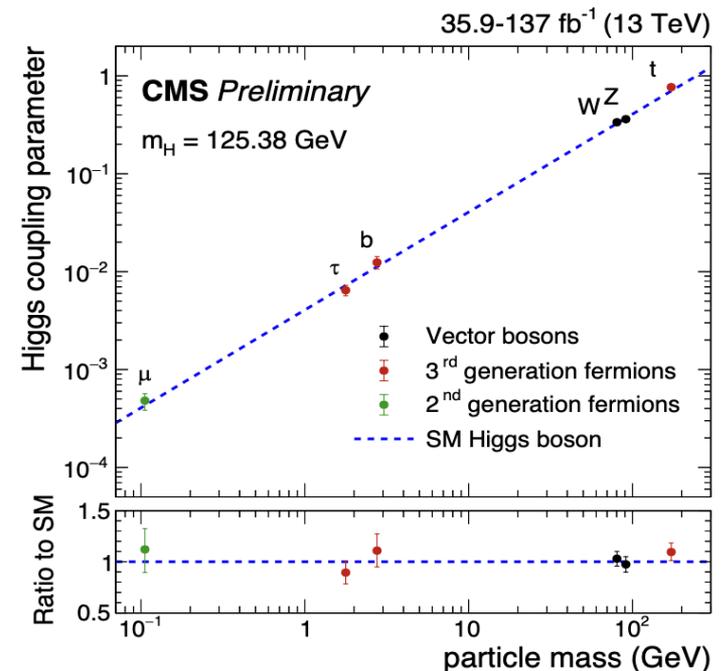
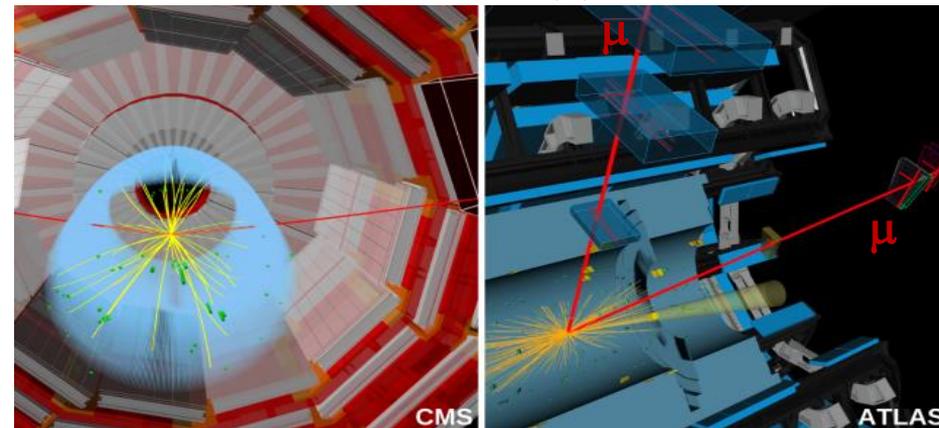
Target Date	Activity
Dec-19	GARD Magnet Development Program
Jan-20	SLAC Sector 30 AIP, QuantISED panel
Feb-20	SBIR Phase I, SBN Ops Readiness
Apr-20	LSST Facility Operations, US-Japan FOA, ANL Institutional
May-20	Mu2e Prelim Ops
Jun-20	ANL Institutional , Accel Stewardship
Jul-20	Energy Frontier Comparative Lab Review , Belle II Ops
Aug-20	GARD Roadmap Reviews (TBC)
Sep-20	HEP Research and Technology Division Committee of Visitors
Oct-20	Cosmic Frontier Comparative Lab Review



Energy Frontier Highlights

- ATLAS and CMS collaborations have collectively published more than 2,000 scientific papers since the start of LHC operations in 2009, including results for:**
 - Precision measurements of particle properties, including the Higgs boson
 - Searches for new physics
- Measurement of $H \rightarrow \mu\mu$ (rare process)**
 - Full Run 2 data at 13 TeV
 - Four components targeting ggH, VBF, VH, and ttH
 - ggH \Rightarrow highest cross section
 - VBF signature provides extra sensitivity
 - Results combined with Run 1 data at 7 and 8 TeV
 - Analysis primarily based on advanced machine learning techniques
- Evidence for $H \rightarrow \mu\mu$**
 - Significance: 3.0σ obs (2.5σ exp)
 - Signal strength: $\mu = 1.19^{+0.41}_{-0.39}(\text{stat})^{+0.17}_{-0.16}(\text{syst})$
- Leading contributions by DOE-supported institutes**

Candidate $H \rightarrow \mu\mu$ Events



Cosmic Frontier

→ Project Highlights in 2020

DESI – Ready to Operate! CD-4 approved May 2020

- Currently recommissioning after COVID shutdown.

LSST Project → now Vera C. Rubin Observatory

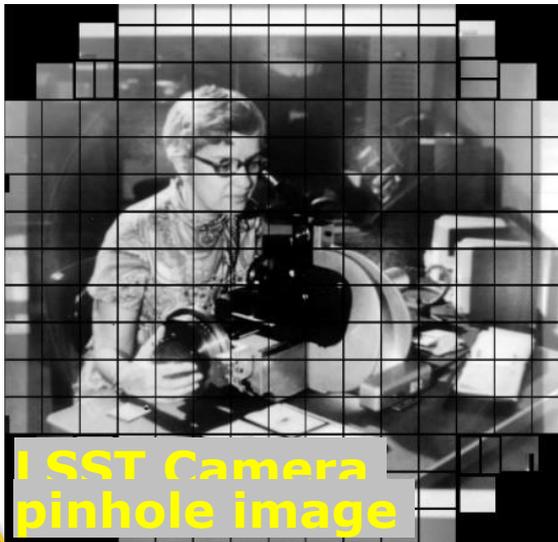
- Camera First Full Image: Largest ever CCD image (3.2 Gigapixel) in a single shot via pinhole (Sept. 2020)

CMB-S4 – LBNL selected as lead lab (Aug 2020)

- setting up organization; planning the schedule to CD-1 pending funding

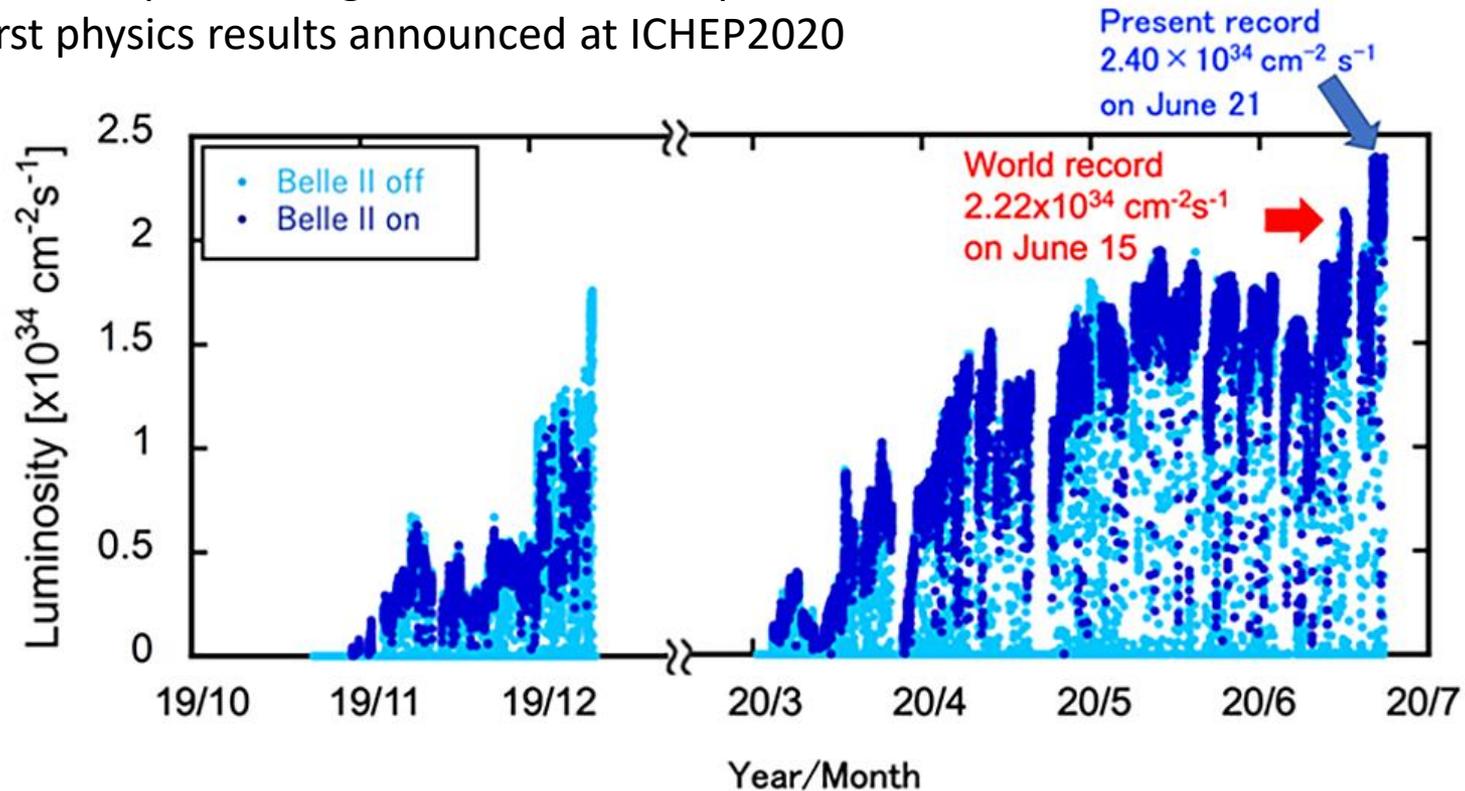
LZ - CD-4 approved Sept. 2020

- commissioning ongoing; science starts ~ April 2021



Intensity Frontier Highlights

- KEK-B sets new luminosity record for e+e- collider : $2.2 \times 10^{34} \text{ cm}^2\text{sec}^{-1}$
- Performance continued to improve towards end of run. New run underway
- Belle II routinely integrates more than 1 fb-1/day, peak so far $\sim 1.3 \text{ fb-1/day}$ (c.f. PEP-II 0.9 fb-1/day, KEKB 1.5 fb-1/day)
- Detector performing well, US Belle II Ops review Nov 2020
- First physics results announced at ICHEP2020



HEP Theory Highlights

- **Muon $g-2$ calculations**

- All contributions are calculated from Perturbative QED and Electroweak calculations; Data-driven dispersive techniques; and/or first principles (Lattice QCD) calculations. Model calculations are no longer included in the theory estimate.
 - The Lattice QCD calculation of hadronic light-by-light now has all systematic errors under control and finds excellent agreement with new dispersive calculations.

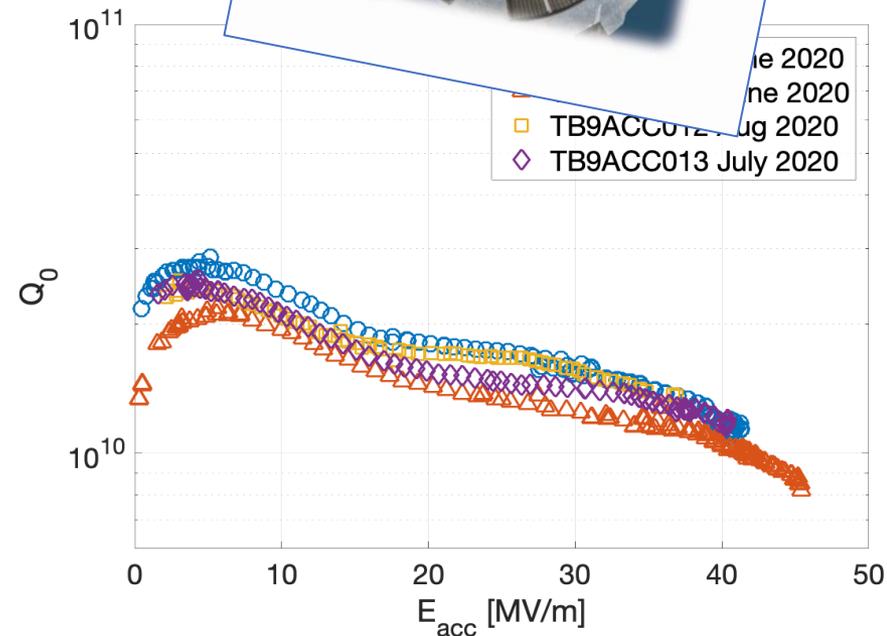
- **International recognition**

- **HEP funded theorists participated in all 3 2021 New Horizons in Physics Prizes:**
 - **Tracy Slatyer** – for major contributions to particle astrophysics, from models of dark matter to the discovery of the “Fermi Bubbles.”
 - **Rouven Essig, Javier Tiffenberg, Tomer Volansky, Tien-Tien Yu** – for advances in the detection of sub-GeV dark matter especially in regards to the SENSEI experiment.
 - **Ahmed Almheiri, Netta Engelhardt, Henry Maxfield, Geoff Penington** – for calculating the quantum information content of a black hole and its radiation.



GARD 2020 Highlights

- FACET-II project in final stretch toward achieving KPP, CD-4 and on with experimental run.
- BELLA is assembling and integrating components to complete the 2nd Beamline.
- The FAST/IOTA began beam operations for experimental Run-3 with the main goal of demonstrating Optical Stochastic Cooling.
- The Magnet Development Plan has been updated and has been posted on HEP webpage.
- High Gradient Cryomodule R&D with new cavity treatments achieved gradients up to 46 MV/m (with average of 41 MV/m). 
- Preparatory workshops had been held by the GARD community to chart out a strategic plan for the Accelerator and Beam Physics thrust.



SC Solicitations and Awards Management

The SC Program Offices have been making accommodations for researchers and institutions in its awards management to be responsive to the impacts of the COVID-19 pandemic.

- On March 13th, SC issued guidance to the research community regarding accommodating interruptions due to the COVID-19 pandemic.
- Updated guidance on SC's response to delayed research progress as a result of the pandemic and Q&As were issued in September.
(<https://science.osti.gov/grants/Policy-and-Guidance/COVID>)
- SC has supported the Federal (OMB) and DOE award flexibilities that allow institutions to continue to charge the salaries and benefits of award personnel to SC awards if the recipient institution permits salaries to continue to be paid in the event of emergencies or disasters.

SC Accommodations for Applicants and Awardees

- In March, **SC immediately extended the application deadlines** for FY 2020 solicitations, and made individual accommodations for Principal Investigator (PI) submissions beyond those deadlines upon request.
- **SC has responded promptly to requests for no-cost extensions on awards.**
(SC received an 18% increase in the requests for no-cost extension between March 1 and August 30th over the same period last year.)
 - ~57% of requests referenced “COVID,” “coronavirus,” or “pandemic.”
- **SC has accommodated late progress reports.**
(About 31% of progress reports received between March 1 and August 30th were late, this was no change from the same time period last year.)
 - ~ 52% of progress reports “COVID,” “coronavirus,” or “pandemic.”
- SC Programs have ongoing conversations with PIs about the reallocation of funding within existing awards and making accommodations for new start dates.
- **No impacts to SC peer reviews and award selection and issuing awards.**

Understanding the Impacts to SC Research

In May, SC stood up an internal task group focused on identifying the impacts on SC research funded through financial assistance (grants and cooperative agreements) as a result of the COVID-19 pandemic.

- SC has been engaging scientific professional societies, university associations, and other Federal agencies to obtain up-to-date information on the impacts to institutions and research communities.
- In October, SC and the American Associated Universities (AAU) co-hosted a focused roundtable discussion with university Senior Research Officers.
- In early December, SC will issue a survey to its PIs. This voluntary survey will focus on questions related to impacts to research progress and award personnel (primarily graduate students and postdocs).

The efforts of the task group serve to inform a corporate SC response to the impacts that is open, transparent, and equitable within available resources.

HEP Comings and Goings

- **Outgoing:**
 - Michael Cooke now Sr Technical Advisor to SC Deputy Director (SC-3). Congrats!
 - Eric Linder (IPA) term ended in November
- **Incoming:**
 - Brian Beckford started as new Intensity Frontier PM Aug 1.
 - Adam Iaizzi (AAAS Fellow) working with Abid Patwa on International Agreements
 - Michael Tennenbaum (AAAS Fellow) working with Eric Colby on science metrics
- **Job Opportunities**
 - **Open now: Program Manager for Communications and Strategic Planning.**
Application deadline extended to Mon Dec 7. *See next slide for details.*
 - TBA, **Program Manager for AI/ML.** Expect announcement soon. Short application window.
- **Help Wanted**
 - COV report reiterates request for HEP Theory IPA
 - Also identified other areas (project oversight, operations) that will likely need additional help as large P5 projects ramp-up and come on-line



Program Manager for Communications and Strategic Planning

The DOE Office of High Energy Physics (HEP) is seeking candidates for a permanent physicist position:

Position: Physicist

Pay Plan, Series and Grade: GS-1310-14/15

Announcement Number: TN-20-SC-00568-DE

Organization: Office of High Energy Physics, Office of Science, US Department of Energy

Location: Germantown, Maryland

Opening Date: November 24, 2020

Closing Date: ~~December 3, 2020~~ **December 7, 2020**

Responsibilities

- Serve as a recognized scientific authority and expert in the area of experimental particle physics.
- Serve as a technical authority for the high energy physics research program.
- Prepare narrative portions of the Office's budget relating to high energy physics.
- Provides policy and scientific/technical advice and analysis to the supervisor relative to strategic planning for the purpose of establishing Office research goals in complex and evolving research areas.

<https://www.usajobs.gov/GetJob/ViewDetails/585344600>