



U.S. DEPARTMENT OF
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HEP Review Reports and Funding Opportunities

*HEPAP Meeting
29 November 2018*

*Glen Crawford
Research & Technology Division Director
Office of High Energy Physics
Office of Science, U.S. Department of Energy*

Outline

▶ **Reports and Outcomes from Recent HEP Research Reviews**

- ▶ FY 2018 University Comparative Review : final
- ▶ Portfolio Review : update
- ▶ HEP QIS 2018 Funding Opportunity : *see Lali's talk*
- ▶ DOE Lab Research Comparative Reviews:
 - ▶ Theory
 - ▶ General Accelerator R&D
 - ▶ Intensity Frontier

▶ **Current and Upcoming Funding Opportunities**

- ▶ FY 2019 University Comparative Review
- ▶ US-Japan Cooperative R&D
- ▶ Early Career
- ▶ Accelerator Stewardship and Traineeship

▶ **Possible Future Opportunities**

- ▶ New Directions in Dark Matter
- ▶ CMB-S4

▶ **HEP Communications Update**





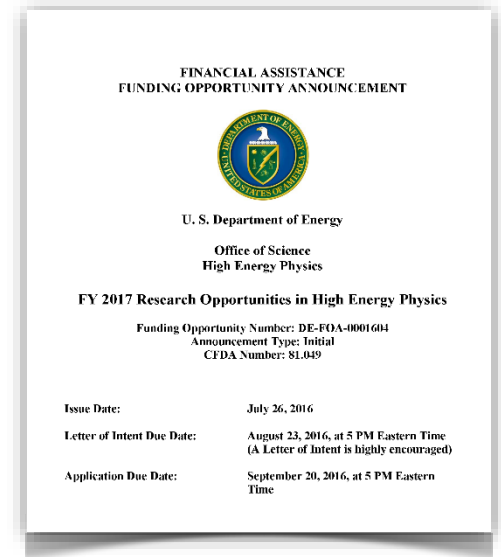
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FY2018 Research Reviews

FY 2018 HEP Comparative Review

- Funding Opportunity Announcement (FOA), “FY 2018 Research Opportunities in High Energy Physics” [DE-FOA-0001781], for the FY 2018 university comparative review process was issued **June 28, 2017**
 - Marked the 7th round of annual university comparative review process in HEP
- **6 HEP research subprograms:**
 - Energy, Intensity, and Cosmic Frontiers
 - HEP Theory
 - Accelerator Science and Technology R&D
 - Detector R&D
- **Letter of Intent (strongly encouraged) due August 10, 2017**
- **Final Proposal deadline September 12, 2017**
- In addition to information provided in the FOA, a FAQ was provided on the DOE/HEP Funding Opportunity website with answers and guide that addressed key topics relevant to the HEP comparative review process
- For the FY 2018 cycle, **132 proposals** requesting support totaling **\$182M** in one or more of the 6 HEP subprograms were received by the deadline in response to the FOA



FY13–18 Review Data: Proposals & PIs

	HEP Total – Review by Proposals [across all 6 subprogram]					
	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
Received	185	129	146	156	146	132
Declined w/o Review	23	5	7	22	10	5
Reviewed	162 (58)	124 (71)	139 (79)	134 (69)	136 (69)	127
Funded	101 (20)	62 (17)	63 (16)	77 (20)	78 (20)	77
“Success Rate” (%)	62	50	45	57	57	61

	HEP Total – Review by Senior Investigators [across all 6 subprograms]					
	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
Received	504	285	326	363	403	314
Declined w/o Review	42	8	13	54	17	6
Reviewed	462 (113)	277 (97)	313 (128)	309 (111)	386 (112)	308
Funded	338 (40)	178 (31)	174 (24)	199 (31)	267 (39)	194
“Success Rate” (%)	73	64	56	64	69	63

- () indicates number of proposals or PIs that did not receive DOE HEP funding in the prior fiscal year.
- “Success Rate” is = # Funded/ # Reviewed.
- FY 2018 proposal and PI success rates at 61% and 63%, respectively; comparable to previous reviews.

FY 2018 Review Summary and PI Meeting

- **With respect to previous Comparative Reviews**
 - FY 2018 had slightly smaller numbers of proposals and PIs
 - 132 proposals (FY 2018) vs. 150 +/- 18 (avg FY12-FY17)
 - 314 senior investigators (FY 2018) vs. 356 +/- 82 (avg FY12-17)
 - Overall proposal/PI average success rate similar at 61/63%
 - Historical annual variation in #PIs/proposals has been (mostly) damped
 - Lower number of declined-without-review proposals

- **Due to late FY18 Appropriation, many funding decisions came relatively late**
 - Concerted effort to boost core University Research funding to ~FY17 levels or above
 - Net increase of ~few% over FY17 in Core Research (including ECAs and “one-shot” supplements)

- **To guide PIs and research groups towards the FY 2019 review, DOE/HEP organized HEP PI meeting sessions in Rockville MD Aug 22–24 <https://www.orau.gov/heppi2018/>**
 - Approx. 150 attendees
 - Presentations on overall HEP program and Frontier planning, plus:
 - Federal Budget process, grant writing, early career scientists, diversity and inclusion
 - Poster session
 - Dozens of 1-on-1 meetings with program managers

HEP Portfolio Review Summary

Priority v DOE Annual Cost (from panel report):

Ranking	<\$1M/yr	\$1-2M/yr	\$2-4M/yr	>\$4M/yr	comment
Tier I		eBOSS, T2K		DES, NOvA	“should be pursued with highest priority”
Tier II	NA61/ SHINE	HAWC, Minerva			“outstanding promise and relevance”
Tier III	SuperK	Daya Bay	Fermi/LAT, microBoone		“address P5 drivers in important ways”
Tier IV	KOTO			AMS	“require further demonstration of likely success, or...less effective in advancing P5 drivers”



Portfolio Review – Notes on Process

- ▶ After report was issued, several discussions with spokespeople and international partners
 - ▶ Reiterate DOE support as needed
 - ▶ Some of these discussions are ongoing
- ▶ Formal letters with DOE guidance issued to spokespeople, US contacts (cc host labs) in October
 - ▶ Recap review findings and current DOE scope in the experiment
 - ▶ Identify (in most cases) “sunset” dates for conclusion of DOE support for operations and/or analysis as appropriate
 - ▶ Includes provisions for data preservation and public data releases
 - ▶ In some cases, this recertifies or slightly modifies previously issued operations guidance
 - ▶ Reiterate DOE support through this period, however:
 - ▶ *“Applications for research funding with proposed scope extending beyond [end-date] will be given low programmatic priority and may be administratively declined.”*
 - ▶ Possible proposals for U.S. participation in future upgrades or detector reconfigurations to be considered separately
 - ▶ Some individual experiment summaries in following slides (+see Backup slides)



HEP Portfolio Review Outcomes III

▶ **Tier III:**

▶ **Super-K:**

- ▶ Operating at least through mid-2020s
 - ▶ US groups have significant responsibilities for detector maintenance, calibrations and operations
- ▶ Request U.S. groups, in consultation with Super-K management, to develop a plan to conclude US involvement in Super-K operations and analysis by 2022, including a staged hand-off of important US operations responsibilities.

▶ **Daya Bay:**

- ▶ Operations conclude in 2020.
 - ▶ Per prior agreement, DOE no longer contributes to experiment operations, but continues to support data management and computing
- ▶ Support U.S. groups to conduct research and US responsibilities for computing, with a goal of completing final analyses by 2022.



HEP Portfolio Review Outcomes III

▶ Tier III:

▶ Fermi/LAT:

- ▶ NASA Senior Review in 2019 will consider possible further operations for this mission
 - ▶ Per prior agreement, DOE contributes to limited experiment operations responsibilities based at SLAC, ramping down by 2019
- ▶ Support U.S. groups to conduct research and DOE operations responsibilities through 2019, with a goal of completing final “10-year” data analyses by end 2020.

▶ MicroBooNE:

- ▶ Operations goal is 13.2×10^{20} protons-on-target, expected by Sep 2019
- ▶ Support U.S. groups to conduct research and operations through 2019, with a goal of completing final analyses by 2022. Any proposal for additional data-taking or analysis of TPC technical and operational issues discovered during current data-taking should be reviewed in the future by the FNAL PAC
- ▶ Pending future reviews by FNAL PAC, if there are significant research or operations activities beyond 2022, these activities may be considered by a future HEP review process



HEP Portfolio Review Outcomes IV

▶ Tier IV:

▶ KOTO:

- ▶ Operating at least through mid-2020's with a series of stepwise upgrades
- ▶ At the time of Portfolio Review (early 2018), panel was not convinced about the experiment's ability to reach its science goals, but was not in a position to make a full technical review of KOTO
 - ▶ Subsequently (summer 2018) the collaboration produced new results based on 2015 data that showed a large step in sensitivity and allowed for much improved extrapolation
- ▶ Panel specifically recommended that DOE *"work with other stake-holders, particularly in Japan, to perform a more detailed systematic review of this experiment."*
- ▶ Pending the outcome of that review, we take no decision at this time on future DOE/HEP support for KOTO, including possible future upgrades.
- ▶ DOE conducted an expert technical review of KOTO in DC Nov 1-2 with U.S. and Japanese groups participating, including spokespeople. J-PARC Director also attended.
- ▶ The KOTO Technical Review panel was favorably impressed with the progress on detector upgrades and data analysis presented:
 - ▶ *"The near-term technical plans are feasible and well-managed. The currently envisioned upgrades appear well-motivated and should carry the collaboration to the next step in scientific performance"*
- ▶ In discussion with U.S. groups concerning next steps.



HEP Portfolio Review Outcomes IV

▶ Tier IV:

▶ AMS:

- ▶ Operating on International Space Station at least through 2024
- ▶ Portfolio Review identified the important P5-relevant measurements that could be made by AMS are the abundance and spectra of cosmic ray antimatter, which can give indirect information about dark matter and/or new physics.
- ▶ The review panel found that additional data is unlikely to resolve whether the currently observed dark matter “signal” is truly due to new physics, versus an unknown or poorly understood astrophysical background process
- ▶ Exchanged letters with AMS spokesperson and NASA; met with AMS collaborators at CERN in May 2018
- ▶ In discussion with U.S. groups, NASA and collaboration concerning next steps.



DOE Lab Comparative Review: HEP Theory

- ▶ Review was held July 9-12 in DC area. Groups under review:
 - ▶ ANL particle theory group and cosmology group
 - ▶ BNL theory group
 - ▶ FNAL theory and astrophysics theory groups
 - ▶ LANL theory group
 - ▶ LBNL theory group
 - ▶ LLNL theory effort
 - ▶ SLAC theory and SLAC-Kavli Institute for Particle Astrophysics and Cosmology (KIPAC) theory groups
- ▶ The panelists were requested to evaluate the laboratories' research contributions (as applicable) along the following programmatic thrust lines:
 - ▶ Phenomenology and Model Building
 - ▶ Lattice Gauge Theory
 - ▶ Cosmology and Particle Astrophysics Theory
- ▶ List of Panelists and Charge in Backup.
- ▶ Report issued Nov 26.



HEP Theory Executive Summary

- ▶ The review shows that the theory programs at the national laboratories are strong and well-aligned with the HEP mission as defined by the P5 recommendations. The theory research activity at the laboratories provides vital contributions to both the HEP program and to the laboratories themselves.
- ▶ The labs provided vigorous responses to the question of why it is appropriate for their various research programs to be based at a national laboratory and the panelists found their arguments persuasive.
 - ▶ In some areas of HEP theory, like fixed-order perturbative QCD, event simulation, and large-scale cosmic simulations, the laboratory efforts dominate the US program
 - ▶ Significant parts of the lab theory program however, like collider phenomenology, BSM model building, and flavor physics, have very strong counterparts in the university theory program. Here, the laboratories were largely successful in arguing that...there is good cause to support the current level of effort in these areas
- ▶ There was one area of criticism that applied to all of the labs: there is a striking lack of gender and ethnic diversity across the lab theory program. Diversity is a problem throughout High Energy Physics, but even by those standards, the lack of diversity stands out.
- ▶ The panel provided the labs with specific recommendations that the theory groups should work with their labs to develop and implement plans to improve their gender and ethnic diversity. HEP concurs with these recommendations and has asked the labs for an initial response by Feb 2019.



DOE Lab Comparative Review: General Accelerator R&D (GARD)

- ▶ Review was held July 30-Aug 4 at lab sites (“roadshow”). Groups under review:
 - ▶ ANL, FNAL, LBNL, SLAC
- ▶ There are no GARD-funded activities at BNL. For completeness, the review also included a stop at BNL since the Accelerator Test Facility there does support user experiments funded by GARD, and because a comparative review of all HEP-funded electron accelerator test facilities was sought
- ▶ The panelists were requested to evaluate the laboratories’ research contributions (as applicable) along the following programmatic thrust lines:
 - ▶ Accelerator and Beam Physics (incl. modeling, simulation, beam instrumentation and controls)
 - ▶ Particle Sources and Targetry
 - ▶ Advanced Accelerator Concepts
 - ▶ RF Acceleration Technology (incl. SRF, NCRF, and RF Sources)
 - ▶ Superconducting Magnets and Materials
 - ▶ Test Facility Operations
- ▶ List of Panelists and Charge in Backup.
- ▶ Report in final draft, should be issued in early December



HEP GARD DRAFT Summary

- ▶ Overall, the reviewers found the HEP Laboratory GARD program to be healthy and vibrant, with broad, meritorious activities being pursued at all the HEP-funded national laboratories.
- ▶ The committee also found the program to be well aligned with the overall HEP mission, especially in thrust areas where GARD research roadmaps have been developed.
 - ▶ It is evident that the roadmap process has had a very positive effect. Every laboratory reported progress against these roadmaps and it is clear they are using them to plan and prioritize activities and facility use. As a result, the program as a whole was found to be well aligned with the overall HEP mission.
- ▶ The performance and accomplishments of all the laboratories have improved considerably compared to five years ago. The user facilities and test facilities are producing an impressive amount of science and there is notable investment in young people and future capabilities.
- ▶ There are, however, two exceptions:
 - ▶ The proton and electron R&D activities are not considered well-balanced, proton R&D should be enhanced; and
 - ▶ There was some concern about insufficient investment in high-power target development, which could limit the energy reach of future Intensity Frontier experiments.



DOE Lab Comparative Review: Intensity Frontier

- ▶ Review was held Sep 4-7 in DC area. Groups under review:
 - ▶ ANL
 - ▶ BNL
 - ▶ FNAL
 - ▶ LBNL
 - ▶ SLAC
- ▶ Several other DOE labs (LANL, LLNL, ORNL, PNNL) have smaller but not insignificant Intensity Frontier efforts. They were asked to present a brief update on their current IF efforts, an outline of future plans, and any responses to comments and recommendations from the previous IF lab comparative review (2013).
- ▶ The panelists were requested to evaluate the laboratories' research contributions (as applicable) along the following programmatic thrust lines:
 - ▶ New Physics Searches : precision measurements at accelerator facilities (Belle II, Mu2e, g-2,...)
 - ▶ Short Baseline Neutrino Physics (SBN program, Minerva, PROSPECT,...)
 - ▶ Long Baseline Neutrino Physics (NOvA, LBNF/DUNE, protoDUNE)
 - ▶ Other, smaller experimental efforts and new initiatives (including neutrino detector R&D)
- ▶ List of Panelists and Charge in Backup.
- ▶ Report in draft, expect to be issued in January





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Current and Near- Future HEP Funding Opportunities

FY 2019 HEP Comparative Review

- Funding Opportunity Announcement (FOA), “FY 2019 Research Opportunities in High Energy Physics” [DE-FOA-0001961], for the FY 2019 university comparative review process was issued **November 5, 2018**
 - Marked the 8th round of annual university comparative review process in HEP
- 6 HEP research subprograms:
 - Energy, Intensity, and Cosmic Frontiers
 - HEP Theory
 - Accelerator Science and Technology R&D
 - Detector R&D
- Letter of Intent (strongly encouraged) due **December 5, 2018**
- Final Proposal deadline **January 22, 2019**
- In addition to information provided in the FOA, an updated FAQ is provided on the DOE/HEP Funding Opportunity website with relevant Q&A
- Minor changes with respect to FY2018 Comparative Review – read the FOA and FAQ carefully! Checklist for Common Errors remains – use it!
- **Funding decisions will not be made before April 2019. Plan accordingly!**

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FY 2019 RESEARCH OPPORTUNITIES IN
HIGH ENERGY PHYSICS

FUNDING OPPORTUNITY ANNOUNCEMENT (FOA) NUMBER:
DE-FOA-0001961

FOA TYPE: INITIAL
CFDA NUMBER: 81.049

FOA Issue Date:	November 5, 2018
Submission Deadline for Letters of Intent:	December 5, 2018 at 5 PM Eastern Time (A Letter of Intent is highly encouraged)
Submission Deadline for Applications:	January 22, 2019 at 5 PM Eastern Time

FY 2019 US-Japan Program

- National Lab Program Announcement (NLA), “*US-Japan Science and Technology Cooperation Program in High Energy Physics*” [LAB 19-1902], for the FY 2019 US-Japan cooperative R&D program was issued **October 15, 2018**
 - Marked the 3rd round of joint US-Japan call for proposals
 - Must be lab-led proposals, consortium model (single lead institution + subcontracts)

- **Research areas supported:**
 - R&D to enhance the physics yield of current or future HEP experiments
 - Accelerator Science and Technology R&D
 - Detector R&D for HEP
 - Workshops, conferences and/or travel to incubate and develop new concepts

- **NOT supported:**
 - ILC cost-reduction R&D (there is a separate funding mechanism for this)
 - Proposals that do not involve significant collaboration between US and Japanese investigators
 - Theoretical research, except via workshops as noted above
 - Scientific staff. Support for engineering or technical staff ok.

- **Final Proposal deadline December 14, 2018**

- **In addition to information provided in the FOA, an updated FAQ is provided on the DOE/HEP Funding Opportunity website with relevant Q&A**

NEW US-Japan Student Exchange Program



BROOKHAVEN
NATIONAL LABORATORY

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Ozaki Exchange Program

Strengthening US-Japan scientific collaboration and facilitating cooperation in accelerator and particle physics, the Exchange Program encourages and funds the exchange of graduate students between Japan and the United States.

Home

- **This program aims to strengthen the US-Japan scientific collaboration by facilitating greater cooperation in projects of mutual benefit to Japan and the United States in the areas of accelerator and particle physics. Each year, up to five proposals will be selected in the U.S. and up to five in Japan.**
 - Graduate students enrolled in US Physics PhD programs are eligible to submit a proposal to conduct HEP research or technology R&D in Japan
 - The duration of the award is for a three- to twelve- month period
 - The award will provide travel, housing and cost of living expenses stipend for the stay in Japan. Tuition will be the responsibility of the students and their home institution
 - **Application will be open by Dec 3rd 2018 with a deadline of Jan 15 2019.**
 - The selection results will be given by March 1 2019. Exchanges start as early as June 1 2019.
 - **Web address and further info: <https://www.bnl.gov/ozaki/>**

FY 2019 Early Career Research

- **Funding Opportunity Announcement (FOA), “*Early Career Research Program*”, for FY 2019 has **NOT** been issued yet**
- DOE/SC intends to issue a FY19 Early Career FOA
- For planning purposes we expect a similar number of HEP awards as 2018
- We will inform the community via email and the HEP website when it is available
- Until then we cannot comment on an unissued FOA

Accelerator Stewardship and Traineeship Funding Opportunity Announcements

▶ **2019 Research Opportunities in Accelerator Stewardship**

- ▶ Supports basic accelerator research of broad benefit
 - ▶ FOAs, reviews, and awards coordinated with 11 federal agencies
- ▶ Planned for release early in 2019
- ▶ Changes and updates:
 - ▶ Significant changes to the High Power Electron Accelerator topic in Track 1
 - ▶ Public outreach events being held in November-December to inform interested users of accelerator R&D capabilities (leading to Track 3 proposals)

▶ **2019 DOE Traineeship in Accelerator Science & Engineering**

- ▶ Supports tuition, fees, stipend for students studying any of 4 areas of critical need:
 - ▶ Physics and engineering of Large Accelerators, Superconducting Accelerators, RF Power Systems, and Cryogenic Systems
- ▶ Planned for release early in 2019
- ▶ Changes and updates:
 - ▶ Award sizes significantly larger than in 2017
 - ▶ Planning on up to \$5M in total award funding
 - ▶ Minimum enrollment requirement has increased
 - ▶ Expecting to make ~2 awards



SC WDTS Research Opportunities

- ▶ Science Undergraduate Laboratory Internships (SULI)
 - ▶ Applications due January 10, 2019 at 5:00 PM ET
- ▶ Community College Internships (CCI)
 - ▶ Applications due January 10, 2019 at 5:00 PM ET
- ▶ Visiting Faculty Program (VFP)
 - ▶ Applications due January 10, 2019 at 5:00 PM ET
- ▶ Office of Science Graduate Student Research Program (SCGSR)
 - ▶ Two annual solicitations in May and November
 - ▶ Most recent solicitation included 15 applications for HEP
- ▶ Albert Einstein Distinguished Educator Fellowship
 - ▶ Annual cycle closed on November 15, 2018





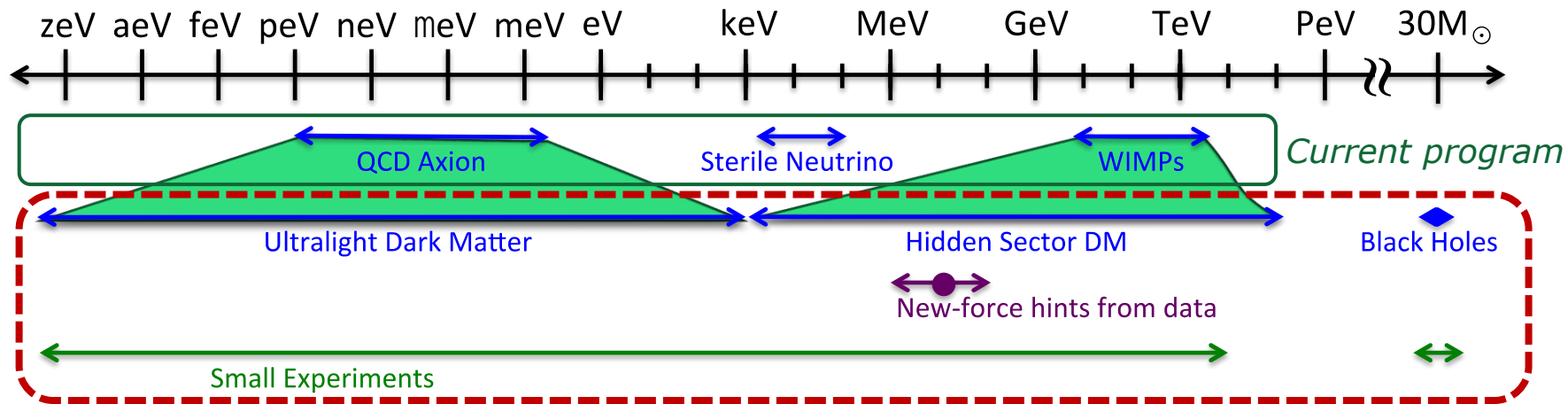
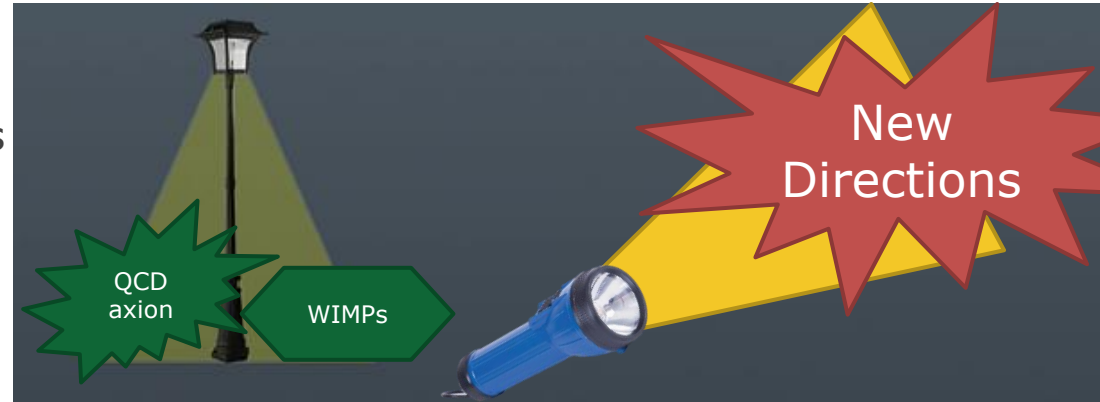
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Possible Future Opportunities

New Opportunities in Dark Matter Science

- ▶ Recent theory highlights well-motivated frameworks with sharp, predictive targets from cosmology, fundamental physics, and anomalies in data
 - ▶ WIMPs, QCD axions central ideas that will be studied with current & planned experiments
 - ▶ Generalized theories have led to new paradigms that small experiments could address



New Directions in Dark Matter

29 November 2018

HEP Reviews and Funding Opportunities

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HEP Basic Research Needs: Dark Matter

- ▶ BRN workshop for **Dark Matter Small Projects New Initiatives** was held October 15-18, 2018
- ▶ Follows the March 2017 community workshop held to determine scientifically compelling areas to search and possible concepts for new experiments or studies
 - ▶ *White Paper:* <https://arxiv.org/abs/1707.04591>
- ▶ BRN Workshop aims:
 - ▶ Identify priority science opportunities for new directions and areas of phase space that will provide significant science return and advancement.
 - ▶ Of these:
 - ▶ Which technology needs for which concepts for new small projects could be ready to go in the near term?
 - ▶ Which would be best carried out using DOE infrastructure and capabilities?
- ▶ Co-Chairs: Harry Weerts (ANL) and Rocky Kolb (U Chicago)



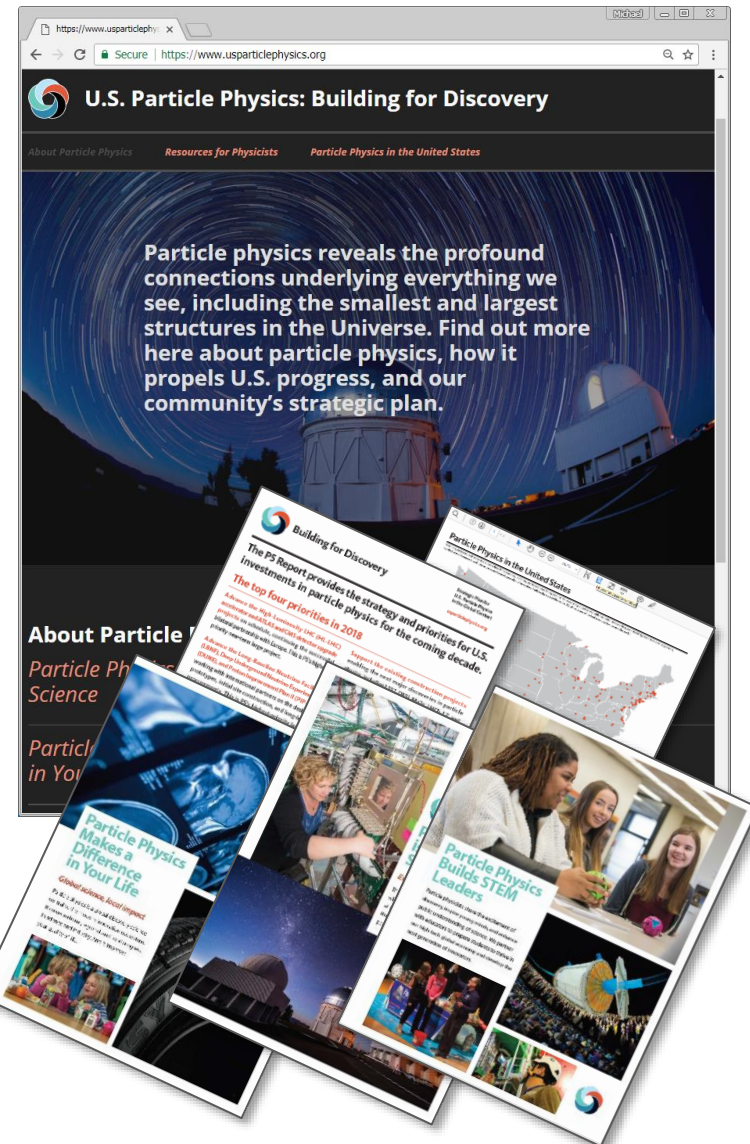
Notional Timeline for New DM

- ▶ **March 2017:** Community-led workshop collected ideas
 - ▶ White paper at <https://arxiv.org/abs/1707.04591>
- ▶ **Late 2018:** Basic Research Needs (BRN) study for Dark Matter New Initiatives
 - ▶ Charged to assess the science landscape for dark matter particle searches, AND
 - ▶ Identify which high impact science areas would be suitable to be pursued with small projects in the HEP program
 - ▶ Main workshop held October 15-18, 2018, report targeted for December
 - ▶ Presentation by Rocky tomorrow
- ▶ **2019:** Support conceptual development of small experiments/projects
 - ▶ Plan to issue FOA to call for concept studies and near-term technology R&D that respond to high impact opportunities described in the BRN, followed by development of small project(s)
- ▶ **2020:** Select concept(s) for fabrication (possibly in stages)
 - ▶ Continue to support theory studies, research efforts, tech. R&D needed to support project(s) as necessary and appropriate



Community Communications Efforts

- ▶ Community groups and Steve Ritz working to update content on usparticlephysics.org
 - ▶ Coordinated effort of DPF Executive Committee, Fermilab UEC, SLUO, and USLUA
 - ▶ With help from AAAS S&T Policy Fellow Andrea Peterson
 - ▶ New brochure will describe collaborative nature of particle physics
 - ▶ Universities, national laboratories, private industry, international partners
- ▶ Community members also working on additional material for individual science drivers
 - ▶ Cosmic Acceleration
 - ▶ Dark Matter
 - ▶ Neutrinos



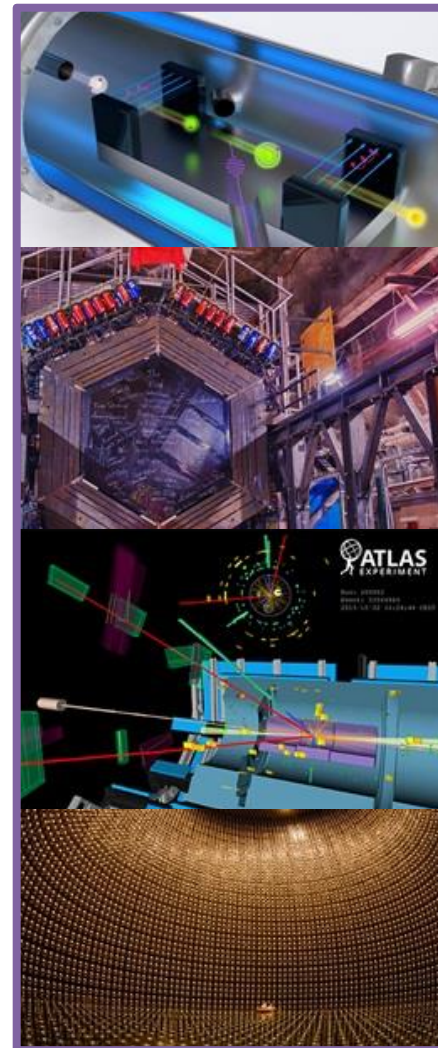
Science Highlights & University Research

- ▶ DOE opportunities to highlight results or amplify articles

- ▶ **University Research** stream on SC Webpage
- ▶ Amplify articles from your institution's webpage

- ▶ **Science Highlights**

- ▶ Create science milestone or result summary articles to inspire science journalists, create conversations on Twitter, and be featured in DOE and White House summaries
- ▶ Contact: Michael.Cooke@science.doe.gov





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Timeline for Updating the U.S. Strategy

- ▶ **The May 2014 P5 report was successful because it was well informed by the science community**, including information from:
 - ▶ 2010 New Worlds, New Horizons in Astronomy and Astrophysics
 - ▶ 2012 Report of the Subcommittee on Future Projects of High Energy Physics (Japan)
 - ▶ 2013 European Strategy for Particle Physics Report
 - ▶ 2013 U.S. Particle Physics Community-driven “Snowmass” process
- ▶ The timeline of processes that impact strategic planning is:
 - ▶ 2018: Anticipated Japanese decision on ILC
 - ▶ 2018-20: New NAS Astronomy and Astrophysics Decadal Survey
 - ▶ 2019: Start of European Strategy for Particle Physics process
 - ▶ 2020: Release of updated European Strategy for Particle Physics
 - ▶ 2020: Earliest opportunity for National Science Board to approve obligating MREFC for HL-LHC
- ▶ From a DOE perspective, the earliest that new “Snowmass,” NAS Elementary Particle Physics Decadal Survey, and P5 processes could begin is 2020
 - ▶ **Relative timing of Snowmass, P5, and NAS EPP Decadal survey to be determined**
 - ▶ **Enables receiving next P5 recommendations in time to inform the FY 2024/25 budget**
- ▶ **U.S. community encouraged to work with international collaborators in developing other regional plans with a global vision for particle physics**



HEP Portfolio Review Outcomes I

▶ Tier I:

▶ T2K, NOvA:

- ▶ Strongly support U.S. groups to conduct research and operations through at least 2022.
- ▶ Pending future reviews by FNAL/J-PARC PAC, if there are significant research or operations activities beyond 2022, these activities may be considered by a future HEP review process
 - ▶ U.S. participation in possible T2K upgrades will be reviewed separately

▶ DES:

- ▶ Operations conclude at end of 2018
- ▶ Strongly support U.S. groups to conduct research and operations through 2018, with a goal of completing final analyses by 2021, including regular data releases

▶ eBOSS:

- ▶ Operations conclude early 2019
- ▶ Strongly support U.S. groups to conduct research and operations through 2019, with a goal of completing final analyses by end 2019, including regular data releases



HEP Portfolio Review Outcomes II

▶ Tier II:

▶ **NA61/SHINE:**

- ▶ Operating through end 2018, with possible upgrades and additional running after 2020
- ▶ Support U.S. groups to conduct research through 2021, including data preservation
 - ▶ Proposals for U.S. participation in possible NA61/SHINE upgrades relevant to the goals of the U.S. neutrino physics program will be reviewed separately as needed.

▶ **HAWC:**

- ▶ Original 5-year operations plan had DOE support concluding in 2019
 - ▶ Most operations and research support comes from NSF and international agencies
- ▶ Panel concluded that P5 dark matter goal “will be furthered if DOE support is extended by another year”
- ▶ Support U.S. groups to conduct research and operations through 2020, with a goal of completing final dark analyses by 2021.

▶ **Minerva:**

- ▶ Operations conclude Sep 2019
- ▶ Support U.S. groups to conduct research and operations through 2019, with a goal of completing final analyses by end 2022, including data preservation



HEP Theory Review Charge

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Department of Energy

Washington, DC 20585

APR 11 2018

MEMORANDUM FOR WILLIAM KILGORE

FROM: GLEN CRAWFORD, DIRECTOR 
RESEARCH AND TECHNOLOGY DIVISION
OFFICE OF HIGH ENERGY PHYSICS

SUBJECT: Charge for Theoretical Physics Research Review

The mission of the Department of Energy High Energy Physics (HEP) program is to seek understanding of how our universe works at its most fundamental level. The Theoretical Physics subprogram supports that mission by fostering fundamental research that provides new insights and understanding into the basic constituents of matter and the forces between them, thereby advancing our strategic goals for science. HEP has supported research in Theoretical Physics since its inception, because theoretical interpretation and analysis underpin almost all progress in high energy physics.

This letter is to request that you conduct a review of HEP-supported laboratory research efforts in the area of Theoretical Physics on July 9-13, 2018, in the Washington, DC area. The purpose of this review is to assess the quality of the recent scientific achievements by these research groups, their impact on achieving the scientific goals and milestones of the field, and the relevance of their research efforts to the overall HEP mission.

We are particularly interested in a review of the laboratories research contributions (as applicable) along these programmatic thrust lines:

- Particle Physics Phenomenology and Model Building
- Cosmology and Particle Astrophysics Theory
- Lattice Gauge Theory

The final report should outline the laboratory-based HEP research program in each of these thrusts and discuss the unique and important elements that the laboratory programs bring to bear in addressing these research topics. In this context, we request a comparative assessment of each laboratory's overall scientific impact and programmatic relevance in these areas relative to its peers, as well as a similar assessment versus comparable university groups. The overall evaluation of the laboratory research groups will be an important input to the process of optimizing resource allocations within the various research thrusts.

For each individual laboratory research group, we also request a specific evaluation of:

- 1) The quality and impact of the contributions by the group and its individual members in the recent past (last 4 years);
- 2) The scientific significance, merit, and feasibility of the proposed research;
- 3) The competence and future promise of the group and its individual members for performing the proposed research;
- 4) For each major research effort within a group's portfolio, the degree to which the proposed research requires or is significantly enhanced by a laboratory setting. When applicable:
 - a) Discuss how being at a laboratory offers unique advantages for intellectual leadership, such as access to facilities or direct interaction with an experiment, that are rare or non-existent in the university program;
 - i) If the research program is rare, non-existent, or under-represented in the university program, discuss why the research is necessary to the laboratory program or to the broader HEP program;
 - ii) If the research effort faces significant competition from the university program, discuss the special circumstances that justify its location at a laboratory;
 - b) Discuss and evaluate explicit examples of the intellectual contributions of group members to the HEP experimental program, either as collaborators or through less formal interactions;
- 5) The adequacy of laboratory-provided resources for carrying out the proposed research; and
- 6) How the group enriches and makes a compelling contribution to the laboratory's experimental program, and how well the group's activities relate to the HEP mission and scientific priorities as defined in the P5 Report. In particular, discuss and evaluate the community leadership displayed by the laboratory theorists.

For those individuals who work within standing scientific collaborations, identify the fraction of the individual's research which is devoted to the collaboration; the individual's role within the collaboration; and the ways in which that role relies upon or leverages the laboratory connection.

The laboratories should provide relevant information which addresses these items in advance of the review. Laboratories should also come prepared to specifically address recommendations and relevant comments from the previous (2014) laboratory Comparative Review of this research area and any other specific questions provided in advance.

I encourage you to interact with the laboratory groups at the review and provide them with whatever immediate feedback you find appropriate. Upon the completion of the review, reviewers should send a letter summarizing their findings, which address both the overall assessment of laboratory contributions to the research thrusts noted above, and the individual laboratory evaluations. The letters will be confidential within HEP. Individual laboratory evaluations will be summarized and conveyed to the laboratories directly. The overall assessment of laboratory contributions to the research thrusts will be incorporated into a summary report from HEP. I would like to receive the final report no later than September 28, 2018.

HEP Theory Review Panel

Last Name	First Name	Institution
Detmold	Will	MIT
Freese	Katherine	U. Michigan
Gonzalez-Garcia	Concha	Stony Brook U.
Hasenfratz	Anna	U. Colorado
Khoury	Justin	U. Pennsylvania
Melnikov	Kirill	Karlsruhe
Qiu	Jianwei	Jefferson Lab
Slatyer	Tracy	MIT
Tait	Tim	U.C. Irvine
Thomas	Scott	Rutgers



HEP GARD Review Charge



Department of Energy
Washington, DC 20585

May 21, 2018

MEMORANDUM FOR LK LEN

FROM: GLEN CRAWFORD, DIRECTOR
RESEARCH AND TECHNOLOGY DIVISION
OFFICE OF HIGH ENERGY PHYSICS

SUBJECT: Charge for HEP General Accelerator R&D Lab Review

The mission of the Department of Energy High Energy Physics (HEP) program is to seek an understanding of how our universe works at its most fundamental level. The General Accelerator R&D (GARD) subprogram supports that mission by fostering fundamental research and development in the science and technology of particle accelerators. This subprogram nurtures the technologies needed to design and build the future accelerator facilities that will be used to carry out the HEP research program thereby advancing our strategic goals for science.

This letter is to request that you conduct an onsite review of HEP-supported laboratory research efforts in the area of the GARD subprogram on July 30-August 4, 2018. The purpose of this review is to assess the quality and impact of the recent scientific achievements by these research groups; the feasibility, relevance and impact of the proposed research on achieving the scientific goals and milestones of the HEP mission; and the national deployment and balance of accelerator test facilities. Your panel will also review the operation of user/test facilities at each laboratory, including reliability, facility up-keep and improvement, cost containment, and how well the users are being served.

For each laboratory's GARD research group, we request a specific evaluation of:

- 1) The quality and impact of the research by the group since the last review in 2013;
- 2) The scientific significance, merit, and feasibility of the proposed research;
- 3) The competence and future promise of the group for carrying out the proposed research;
- 4) The adequacy of resources for carrying out the proposed research, and cost-effectiveness of the research investment;
- 5) The quality of the support and infrastructure provided by the laboratory;
- 6) Where an experimental facility exists,
 - The reliability and cost containment of operation;
 - What is the condition of the facility? What is the deferred maintenance backlog and its associated risk and cost?
 - How impactful is each experiment to achieving the goals of the P5 and GARD subpanel reports, the relevant GARD research roadmaps, and on accelerator science in general?
 - How well the users are being served?

- Is the facility well suited to conduct these experiments?
 - Could this work be done at other test facilities?
- 7) How the group benefits the laboratory's experimental program (as applicable), and how well the group's activities relate to the overall HEP mission; and
 - 8) The overall soundness of the GARD program, potential areas where consolidation or redirection will be beneficial and feasible.

The research efforts should be presented in terms of the laboratory group's contributions (as applicable) along the following programmatic thrust lines:

- Accelerator and Beam Physics (including modeling, simulation as well as beam instrumentation and controls)
- Particle Sources and Targetry
- Advanced Accelerator Concepts
- RF Acceleration Technology (including SRF, NCRF and RF Sources)
- Superconducting Magnets and Materials
- Test Facility Operations

The laboratories should provide information in this format on both their accomplished and proposed research in advance of the review, including the level of effort for each thrust line (FTEs and funding), using the provided Excel template worksheet.

The final report should outline the laboratory-based accelerator R&D program in each of these thrusts and discuss the unique and important elements that the laboratory programs bring to bear in addressing these research topics. **In this context, we request a comparative assessment of each lab's overall performance in these areas relative to its peers, as well as an assessment versus comparable university groups.** The overall evaluation of the lab's research will be an important input to the process of optimizing resource allocations within the various research thrusts.

The HEP GARD program supports a wide range of research thrust areas that are important to HEP needs, both in the mid and long term time scales. As part of this review, we are also requesting the reviewers to provide additional general findings and comments about the current status and future promise of the programmatic thrust areas listed above, for example:

- What are the expected deliverables of this research thrust in the next 5-10 years?
- Are adequate resources in place to plausibly achieve these goals?
- Do the labs have sufficient technical and management infrastructure to reliably deliver the goals for this programmatic area and respond to new developments?
- What is the benefit of additional investments in this particular thrust? What are the likely impacts of reduced investments?

I encourage you to interact with the laboratory groups at the review and provide them with whatever immediate feedback you find appropriate. Upon the completion of the review, reviewers should send a letter summarizing their findings and evaluations, which includes their overall findings on the GARD thrusts, an assessment of lab contributions to these thrusts, and the individual lab evaluations. The letters will be confidential within OHEP.

Individual lab evaluations, along with the findings on the each research thrust, and assessment of laboratory contributions therein, will be incorporated into a summary report. I would like to receive the draft individual laboratory evaluations and the summary report no later than October 1, 2018. Thank you for taking on this important task.

HEP GARD Panel

Last Name	First Name	Institution
Albert	Felicie	LLNL
Galambos	John	ORNL
Kehne	David	Naval Research Lab
Larbalestier	David	Florida State U.
McIntyre	Peter	Texas A&M
Milton	Steve	LANL
Muggli	Patrick	Max Planck Institute
Rimmer	Robert	Jefferson Lab
Russell	Steve	LANL
Tajima	Tsuyoshi	LANL
Ting	Antonio	U. Maryland
Yamazaki	Yoshishinge	Michigan State U.

HEP Intensity Frontier Review Charge

MEMORANDUM FOR KEVIN FLOOD

FROM: GLEN CRAWFORD, DIRECTOR
RESEARCH AND TECHNOLOGY DIVISION
OFFICE OF HIGH ENERGY PHYSICS

SUBJECT: Charge for Intensity Frontier Research Review

The mission of the Department of Energy High Energy Physics (HEP) program is to seek understanding of how our universe works at its most fundamental level. The Intensity Frontier (IF) subprogram supports that mission by investigating some of the rarest processes in nature, including unusual interactions of fundamental particles and subtle effects that require large data sets to observe and measure, thereby advancing our strategic goals for science. Intensity Frontier efforts typically require the use of powerful particle accelerators and ultra-sensitive detectors to reach their goals and enable discovery through precision measurements of rare processes.

This letter is to request that you organize and conduct a review of HEP-supported laboratory Intensity Frontier research efforts September 4-7, 2018 in the Washington DC area. The purpose of this review is to assess the quality of the recent scientific performance by these research groups, the merit and feasibility of their proposed research for achieving the scientific goals and milestones of the field, and the relevance of their research efforts to the overall HEP mission. These assessments should be performed within the context of the Strategic Plan for U.S. Particle Physics in the Global Context formulated by the Particle Physics Project Prioritization Panel (P5) in 2014. The assessments should also take into account, as applicable, any recommendations of the HEPAP Portfolio Review Subpanel in 2018.

We are particularly interested in a review of the labs' Intensity Frontier research contributions along the following programmatic thrusts:

- New physics searches: Precision measurements at accelerator facilities including Belle II, Mu2e, Muon g-2, HPS;
- Short-baseline neutrino physics: Daya Bay, MINERvA, MicroBooNE, ICARUS, Short Baseline Neutrino Detector (SBND), PROSPECT, COHERENT;
- Long-baseline neutrino physics: NOvA, LBNE/DUNE (including ProtoDUNE);
- Other smaller experimental efforts and any new Intensity Frontier initiatives, as applicable.

For each individual lab research group, a specific evaluation is requested for:

- 1) The merit, quality and impact of the research by the group in the recent past;
- 2) The scientific significance, merit, and feasibility of the proposed research for the next three years, as well as for longer term future planning;
- 3) The competence and future promise of the group, as well as the adequacy of resources, for carrying out the proposed research and the cost-effectiveness of the research investment;
- 4) The quality of the support and infrastructure provided by the laboratory;
- 5) Whether the nature and scope of the group's efforts are well-suited for a DOE laboratory research program, and how the group's activities align with and support the HEP Intensity Frontier program and priorities;
- 6) The demonstration of leadership in the Intensity Frontier and the wider scientific community; and
- 7) Workforce diversity and inclusion.

In addition, for each lab, an evaluation is requested as to the programmatic balance between Intensity Frontier subgroups within a lab, including the number of subgroups and the scope of their respective efforts both now and planned for the future. As applicable, this evaluation should be conducted in the context of a lab's response(s) to any relevant recommendations resulting from the HEP Laboratory Optimization process.

Although this review will primarily focus on the Intensity Frontier programs and groups at ANL, BNL, FNAL, LBNL, and SLAC, several other DOE labs (LANL, LLNL, ORNL, PNNL) have smaller but not insignificant Intensity Frontier efforts. In order that reviewers have a comprehensive overview of Intensity Frontier lab activities, I request that each of these four additional labs be asked to present at the review a brief update on their current IF efforts, any response(s) to comments and recommendations from the previous (2013) IF lab comparative review, and an outline of their future plans for Intensity Frontier participation. These updates are meant only to provide background and context for reviewers and, although reviewers should feel free to comment on the smaller IF lab efforts as they deem appropriate, these programs will not be under formal review here.

The final report should outline the laboratory-based HEP Intensity Frontier research program in each of the four general research areas given above, as well as discuss any unique and important elements that the laboratory programs bring to bear in addressing these research topics. In this context, we request a **comparative assessment of each lab's overall performance** in the review areas relative to its peers and, if appropriate, a similar assessment versus comparable university groups; as well as an assessment of overall and per capita effectiveness. These evaluations of the lab research groups are an important input to the process of resource allocation optimization.

The laboratories should provide relevant information by August 24 2018, 10 days in advance of the review, that addresses the above items and facilitates reviewer evaluations. Laboratories should also come prepared to specifically address relevant recommendations and comments from the previous (2013) laboratory Comparative Review of this research area and any other specific questions provided in advance.

Upon completion of the review, reviewers should send a letter summarizing their findings and evaluations, which should address both the overall assessment of lab contributions to the Intensity Frontier research thrusts and the individual lab evaluations. These letters will be confidential within HEP. Individual lab evaluations will be summarized and conveyed to the laboratories, and the overall assessment of laboratory contributions to the research thrusts will be incorporated into a summary report from HEP made generally available to all labs. I would like to receive the individual laboratory evaluations and the draft summary report no later than November 1, 2018.

29 November 2018

HEP Intensity Frontier Panel

Last Name	First Name	Institution
Burkert	Volker	Jefferson Lab
Gollapinni	Sowjanya	Tennessee
Haba	Junji	KEK
Mahn	Kendall	Michigan State
Majewski	Stephanie	Oregon
Messier	Mark	Indiana
Miller	Jim	Boston U
Morii	Masahiro	Harvard
Patterson	Ryan	Caltech
Quinn	Breese	Mississippi
Ritt	Stefan	Paul Scherrer Institut
Savinov	Vladimir	Pitt
Scholberg	Kate	Duke
Soderberg	Mitch	Syracuse
Svoboda	Bob	UC Davis
Toki	Walter	Colorado
Velasco	Mayda	Northwestern

