



Intensity Frontier Program

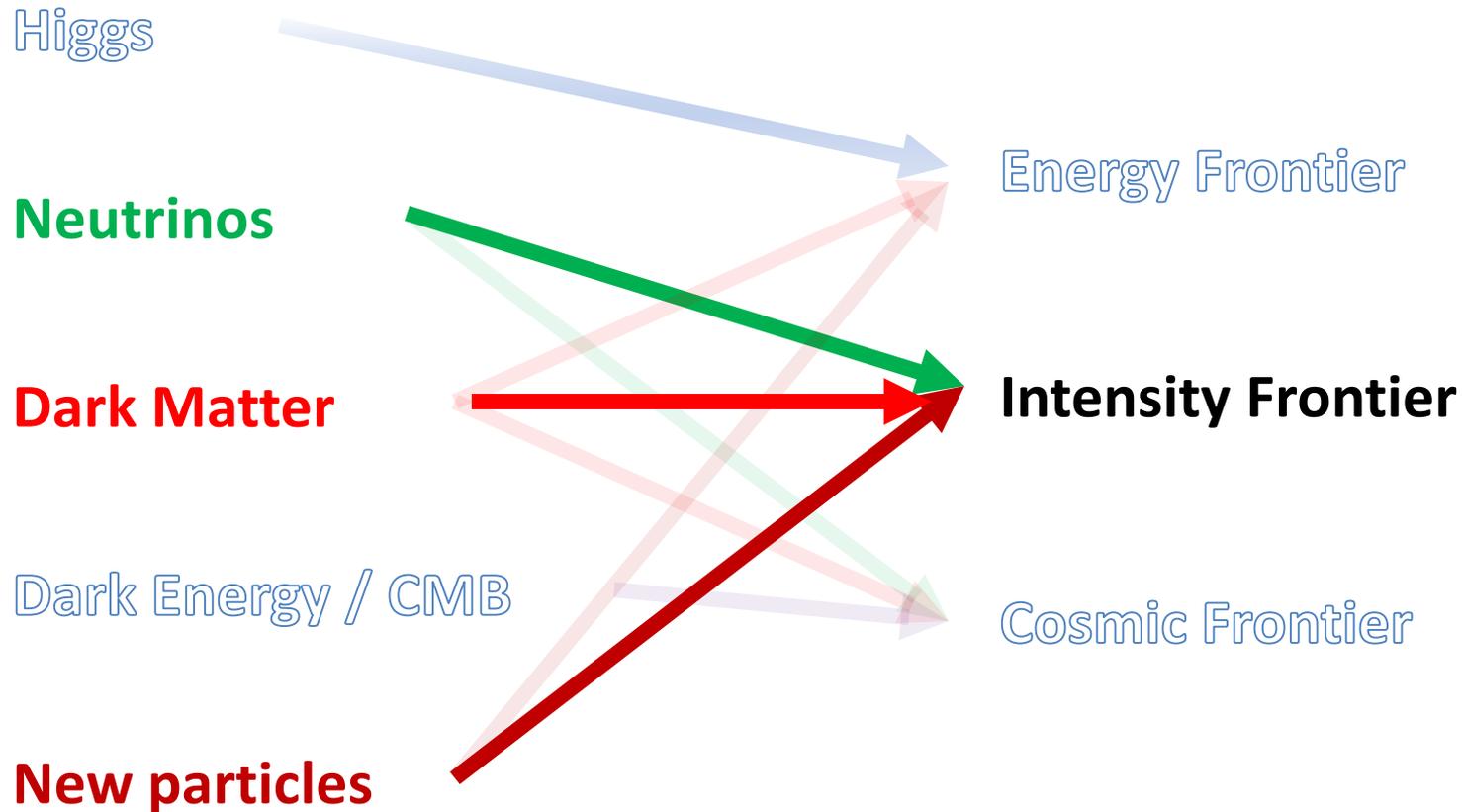
HEP 2014 Principal Investigator (PI) Meeting
Rockville, Maryland
June 16–17, 2014

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Office of High Energy Physics (HEP)
Office of Science, U.S. Department of Energy

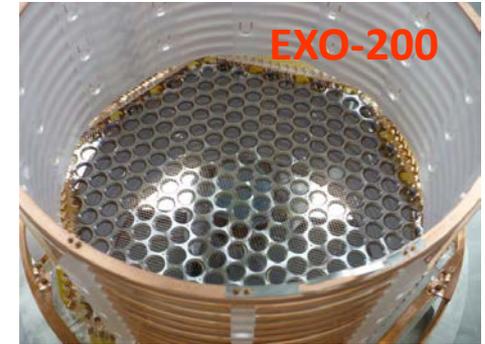
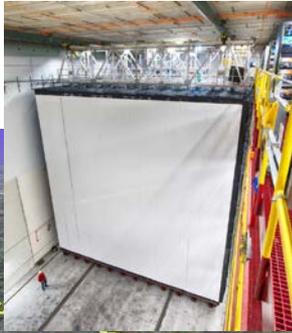
Outline

- **Science drivers**
- **Comments on LBNF, SBL, and the Muon Program**
- **Large project status.**
- **Program activities.**
- **Small projects, experiments, and R&D efforts.**

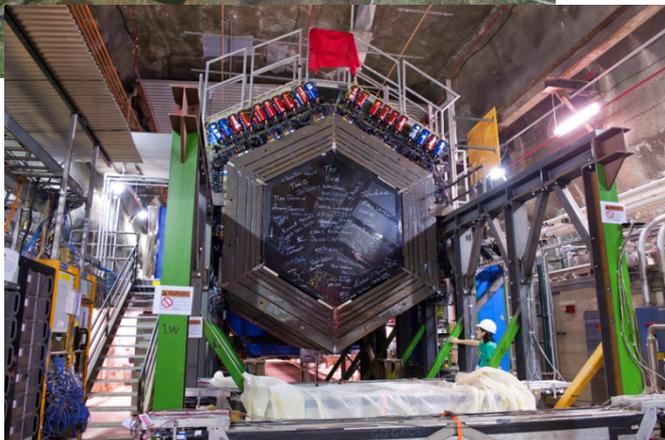
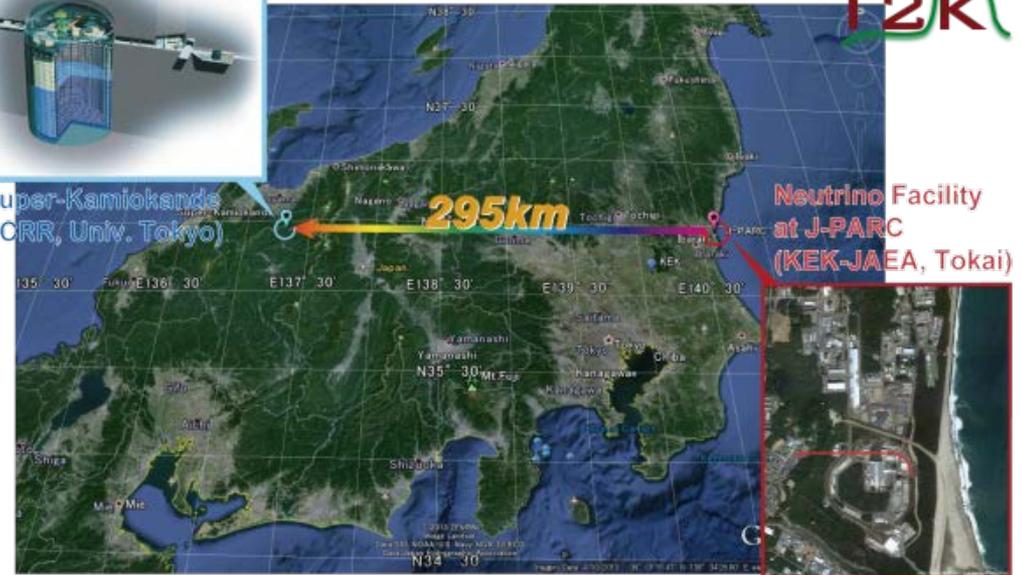
P5 Science Drivers in the Intensity Frontier



Neutrinos—Running Experiments



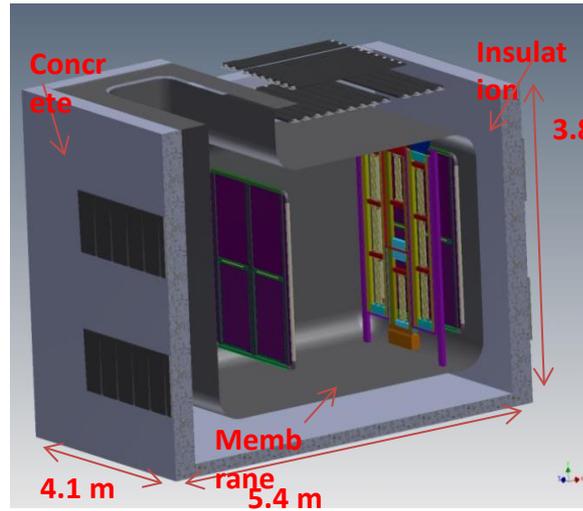
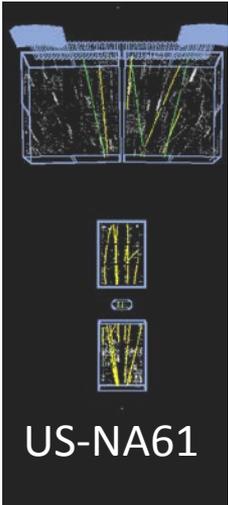
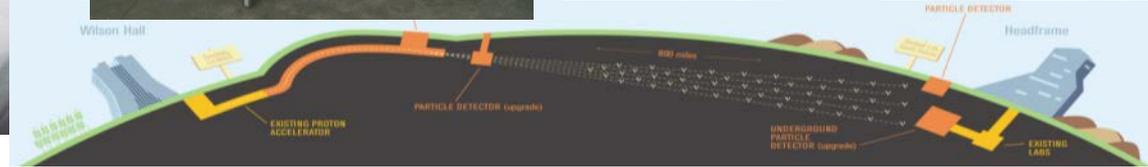
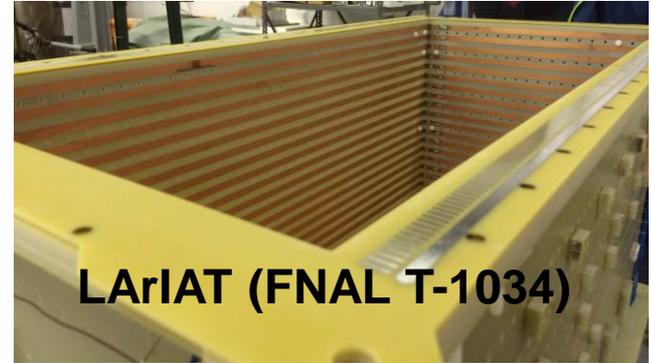
Super-Kamiokande (ICRR, Univ. Tokyo)



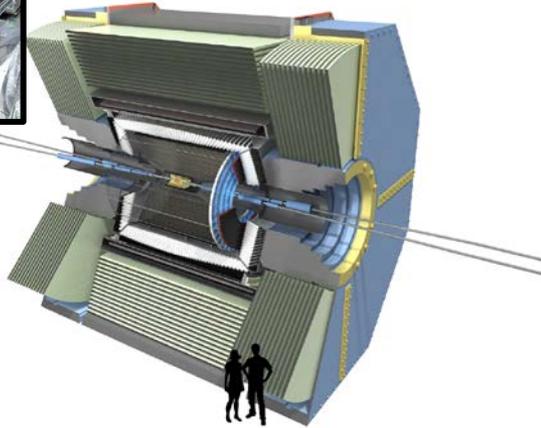
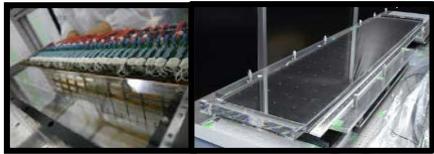
MINERvA at NuMI

<http://minerva.fnal.gov>

The Evolving LArTPC Neutrino Detector Program



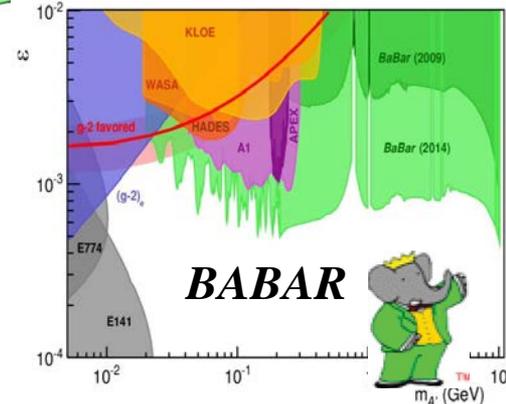
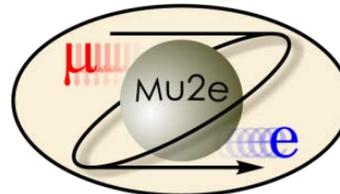
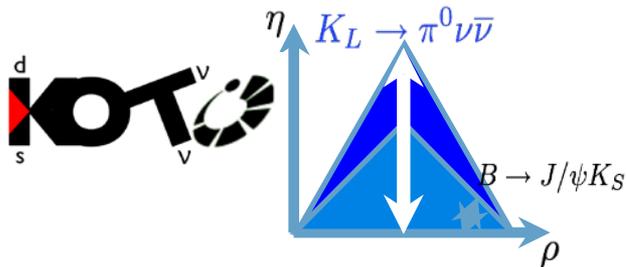
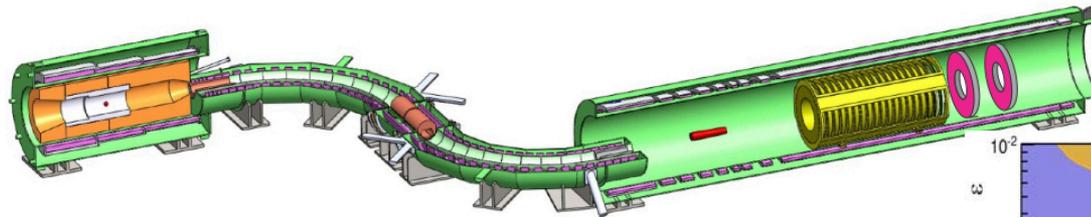
New Virtual Particle Searches with e^+e^- , muons, and kaons



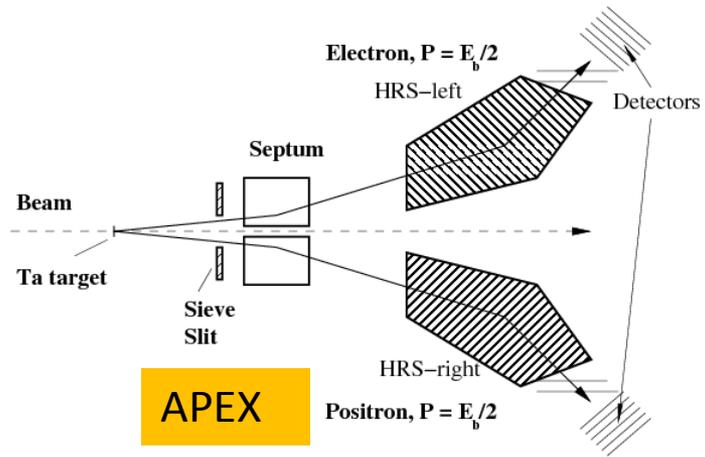
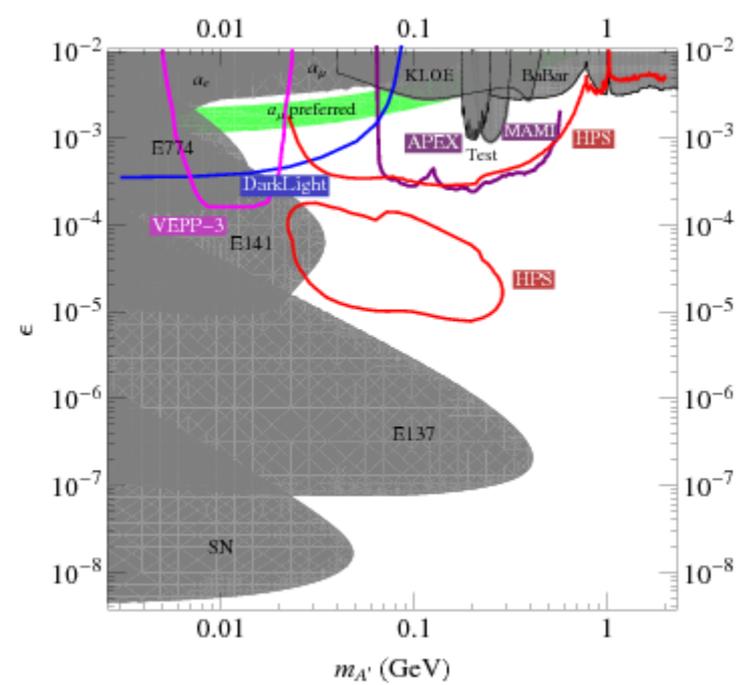
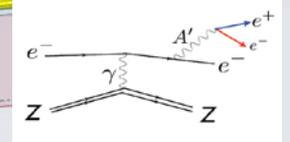
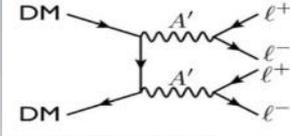
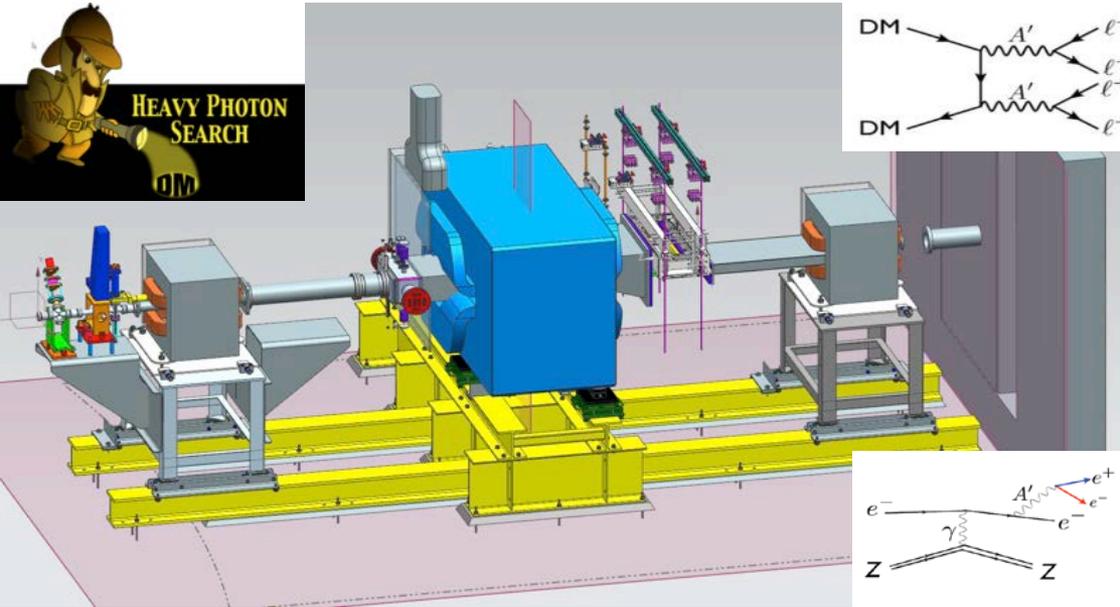
Muon g-2



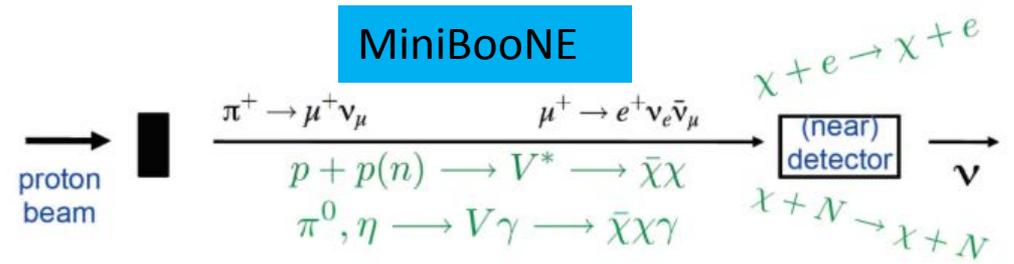
BES III



Probes of the Dark Sector



APEX



MiniBooNE

LBNF

- **Minimal LBNF configuration: At least 10 kT underground at SURF, near detector at Fermilab, 1.2 MW beam via PIP-II.**
 - Or equivalent! New U.S. and international partners will have a major role in final configuration.
 - Reconfiguration and first steps towards internationalization follow in large part from the tremendous efforts of the LBNE collaboration and project.
 - The Fermilab Director will coordinate LBNE→LBNF reconfiguration.
 - HEP anticipates significant community input into this process.
- **HEP will maintain support of the present LBNE project and scientific collaboration through the implementation phase of a fully international LBNF.**
- **Proposals for LBNF related efforts in the FY2015 FOA will be considered to be within the scope of the HEP Intensity Frontier program**
- **Further information will be given at the LBNF presentation at this meeting.**

SBL Neutrino Program at Fermilab

- **HEP anticipates rapid development of this program at Fermilab following the summer 2014 PAC meeting.**
- **Proposals to the FY15 Comparative Review FOA seeking support for participation in LAr1-ND, MicroBooNE, ICARUS, and related technology development efforts at Fermilab will be considered to be within the scope of the HEP Intensity Frontier program.**
- **Further information will be given in the SBL presentations at this meeting.**



Muon Program

- **P5 recommends completion of Muon g-2 and Mu2e.**
- **Both experiments should get CD-2 in CY-2014.**
- **Budget considerations may alter the schedule for Mu2e.**
- **HEP continues to encourage the Mu2e experiment to seek new collaborators.**
- **Further information will be given at the Mu2e presentation at this meeting.**



Intensity Frontier Science at all Scales

- **Strong overlap of with the HEP science drivers, the accessibility of the physics, and the creativity of PIs has created a very active and dynamic Intensity Frontier program.**
 - Six ongoing CD-driven projects: Belle II, LBNE, Mu2e, Muon g-2, MicroBooNE, and NOvA.
 - A suite of operating small experiments exploiting scientific targets of opportunity: APEX, EXO-200, HPS, KOTO.
 - Productive continuing programs: BaBar, Belle, BES III, Daya Bay, MINERvA, MINOS+, T2K, SuperK.
 - A diverse set of R&D activities: CAPTAIN, LArIAT, LBNE 35T, US NA61, nEXO.
 - Percolating ideas for new small-scale initiatives: COHERENT (elastic ν A scattering at SNS), NuSTEC (ν A cross sections), PROSPECT (VSBL ν at HFIR), WATCHMAN (Reactor ν physics with NNSA partnership).

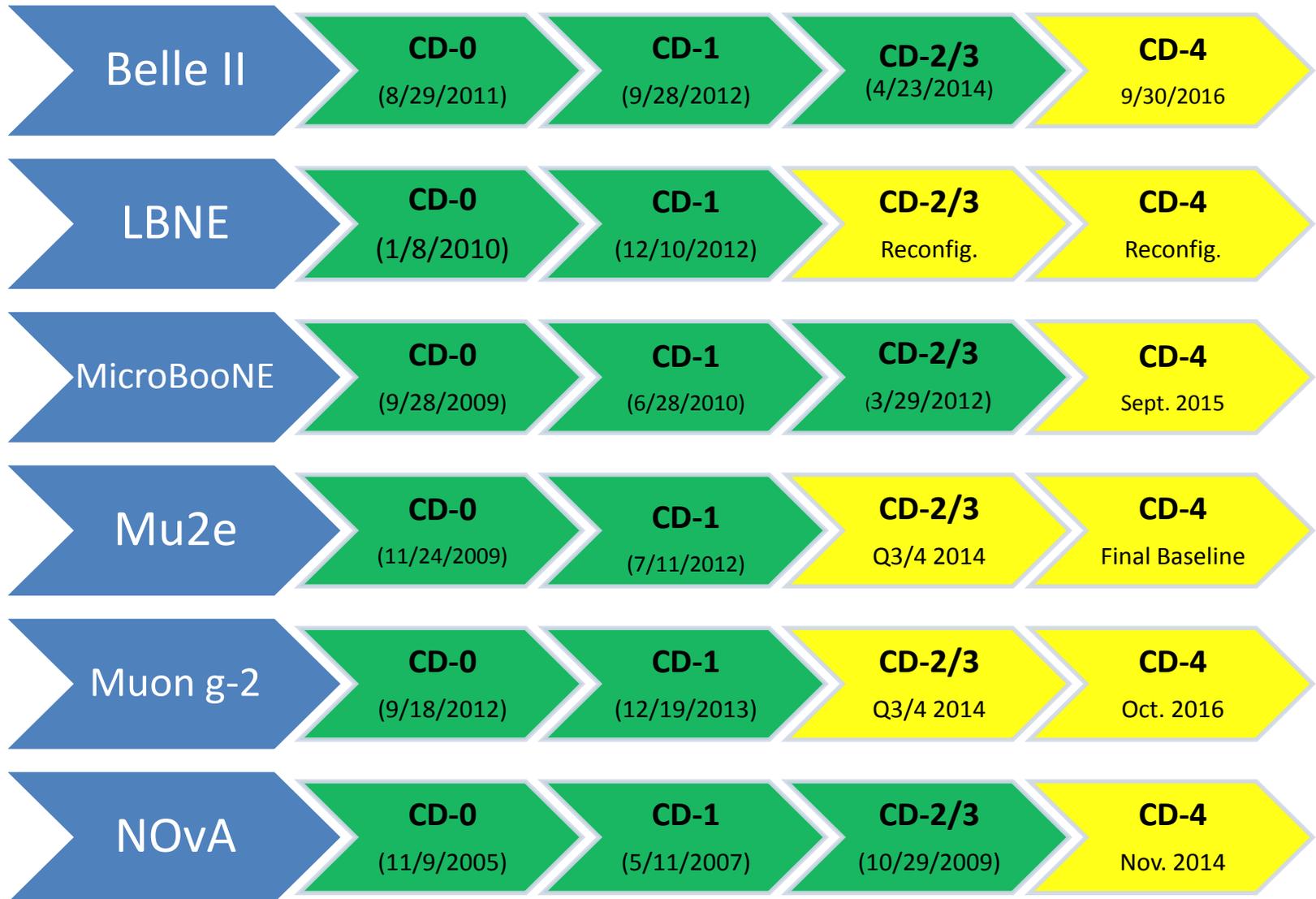


Program Activities over Past 12 months

- **Successful CD reviews:**
 - Belle II
 - Mu2e
 - Muon g-2
- **DOE briefings:**
 - LBNE
 - nEXO
 - HPS
 - WATCHMAN
 - APEX
 - BaBar
 - Daya Bay
 - US NA61
- **Operations Reviews**
 - Daya Bay
 - Belle II
 - LBNE
- **Plus many outreach activities:** Snowmass, P5, DPF, Neutrino 2014, Site visits in USA and Japan...



Project Status



Support for Small Independent R&D Efforts

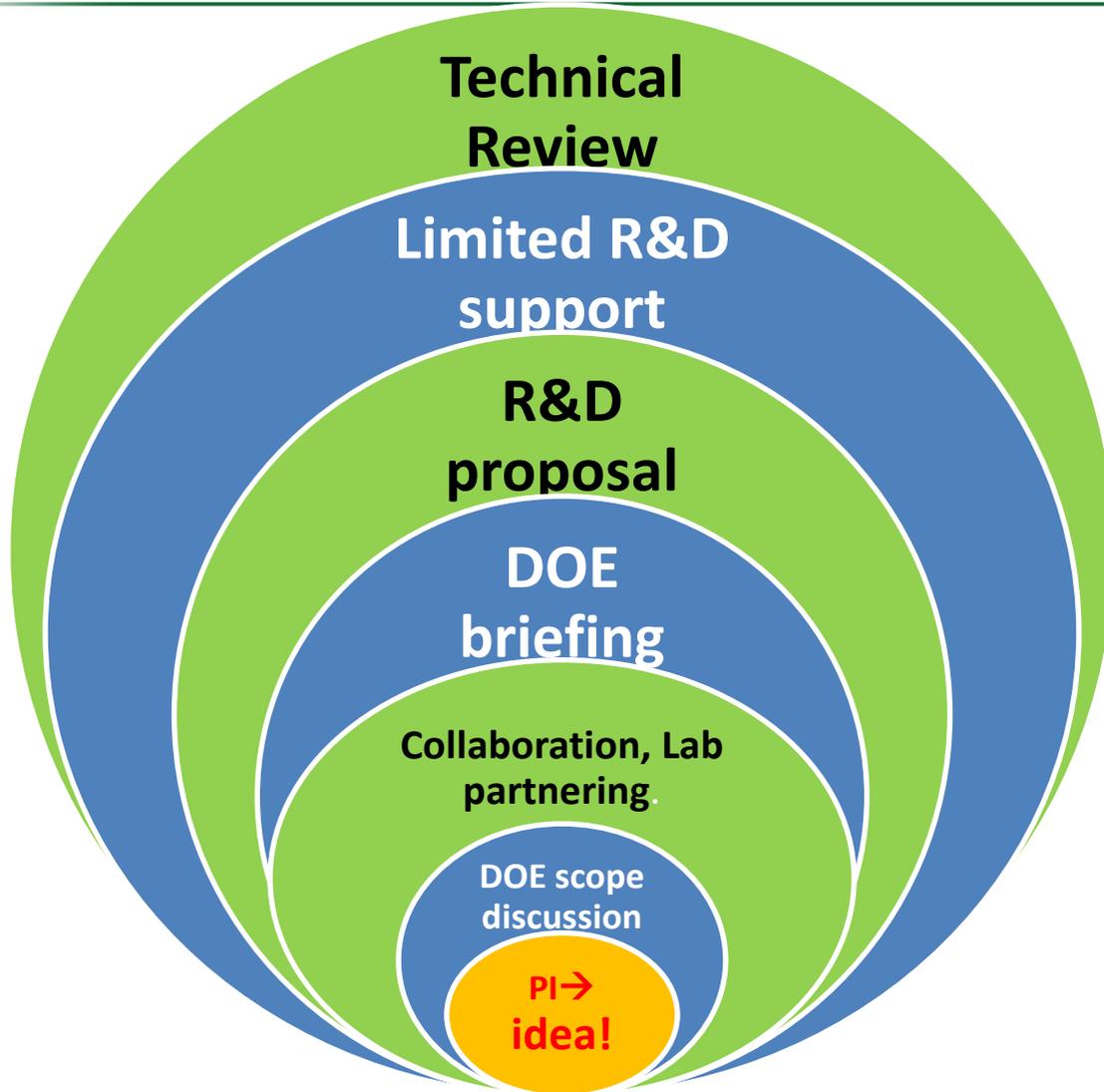
- **If based at an Office of Science Lab:**
 - Follow PAC process at lab.
 - Prepare R&D proposal for HEP.
 - Prepare presentation to HEP.
 - HEP will use PAC report, Lab Reviews, R&D proposals, and presentation materials to decide on R&D support.
- **If not based at an Office of Science Lab**
 - Prepare a white paper and submit to DOE.
 - Schedule an initial phone meeting with HEP.
 - Prepare an R&D proposal for HEP.
 - Prepare a presentation to HEP.
 - HEP may provide limited ~1 year of R&D support based on an internal evaluation.
 - Decisions for longer term and more extensive support will be based on a technical review organized by HEP after ~1 year.
- **Important notes:**
 - Formulate a project management scheme early.
 - Funding is tight.

Pointers on Intensity Frontier R&D Initiatives

- Intensity Frontier R&D activities reviewed case by case
 - Target of opportunities: fast, cost-effective and compelling (discovery potential)
- What constitutes Intensity Frontier R&D?
 - Perform simulations and physics studies in support of the conceptual and preliminary design of a future experiment or project
 - Develop and demonstrate the technical feasibility of novel detectors or systems
 - Design, construct, commission, and operate a prototype experiment
- What are the ground rules?
 - Start at home. Seed support from Univ. start-up, LDRD, private foundation, etc.
 - There is not a separate pot of money. All funding comes out of research. Be thrifty. Be reasonable. R&D proposals should be mainly for technical support.
 - Form a strong & credible collaboration. Partnerships with labs and universities are preferred. International participation is encouraged.
 - Socialize with the funding agencies AND lab management at the earliest opportunity.
 - Briefings to DOE (or NSF). PAC(s) should have a voice.
 - How and when does this activity fit within the HEP mission and Intensity Frontier portfolio?
 - Technical proposal will be reviewed. Research will be reviewed. Separately.



Process schematic for Small Projects, Experiments



Important thresholds:

- \$2M capital equipment cost or \$5M total project cost. MIE called out in federal budget. Requires two year lead time.
- \$10M total project cost. Critical Decision process involving Office of Project Assessment (OPA). HEP must initiate CD-0. Can be lowered by HEP or OPA.
- ??? Possible new National PAC limit. Still under discussion.
- Labs have internal thresholds and procedures.
- No separate HEP small projects budget is maintained.
- Early discussions with HEP are essential!



Activities at this Meeting

- **Monday afternoon, Tuesday morning and afternoon.**
 - One on one meetings between PIs and AS, TB.
 - Please be on time; we have a very full schedule.
 - We regret the limited duration of the meetings.
- **Topical presentations of interest on Tuesday:**
 - University issues.
 - Grants.
 - Detector R&D.
- **Questions?**