

Expanded Accelerator Options for Forefront New Physics Searches,

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SLAC P5 Town Hall,
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Request: Recommend a thriving program of small accelerator-based experiments located beyond FNAL and CERN

Opening otherwise unreachable new physics:

By exploiting accelerators with different capabilities, these experiments can access BSM physics that is entirely new, Pointing the way toward new ideas for the "mother laboratories" in the future.

Strengthening connections to our near-neighbor communities:

Building allies in the NP, BES, NNSA and broader NSF communities in the US and abroad!

Leveraging opportunity:

Compared to most "small" experiments, these experiments receive a high fraction of non-US-HEP support

Examples:

Experiment	Unique Qualities of Accelerator/Complex	Allies
CCM	Fast pulse (~100 ns now; 30 ns future) 800 MeV protons, ample shielded space w/i 20 m	US NNSA
Coherent	World-leading power for 800 MeV protons on target (1.4 MW and rising)	US BES
IsoDAR	Underground source producing more than a mole of neutrons capturing on ⁷ Li	Korea IBS
JSNS2	3 GeV protons on target allowing Kaon-Decay-at-Rest	Japan MLF
LDMX	Uses an electron beam!	US BES

& others

Why a special shout-out from P5?

Accelerator-based HEP has struggled with cross-agency collaboration and foreign-footprint collaboration beyond CERN, despite the great value of these partnerships.

CCM (Coherent Captain Mills): A Great Example of P5 influence-for-good

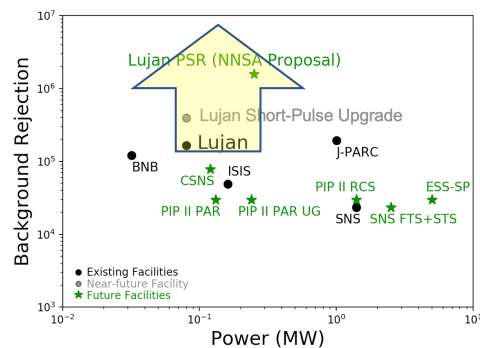
2014 P5 included language with general support for small experiments -- this led to DOE's DMNI program.
CCM was one of the first DMNI experiments funded!

CCM, at LUJAN (LANL) uses a pulsed 800 MeV proton source to search for exotic particle produced in the target.

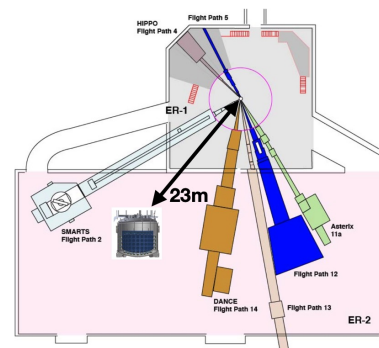
Quick! 2018 - proposed ; 2019 - CCM120 (protoype) run; 2020 - DMNI funding; 2021 - CCM200 engineering run;
2022-26 CCM200 running;

Physics-forward! Since 2021, 1 PRL + 2 PRD + 1 thesis so far! Expect 3 more papers and 1 more thesis by autumn!
New reach: Leptophobic DM; Portal DM; QCD Axion; ALPS; mirror neutrons, for more see NF03 study...

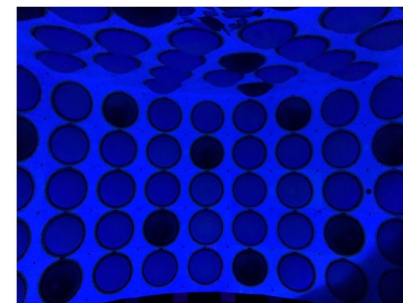
Leveraged! LANL (NNSA/LDRD), DMNI (DOE Cosmic Frontier), DOE Intensity Frontier, and NSF + international



What's unique? short pulse = low backgrounds;



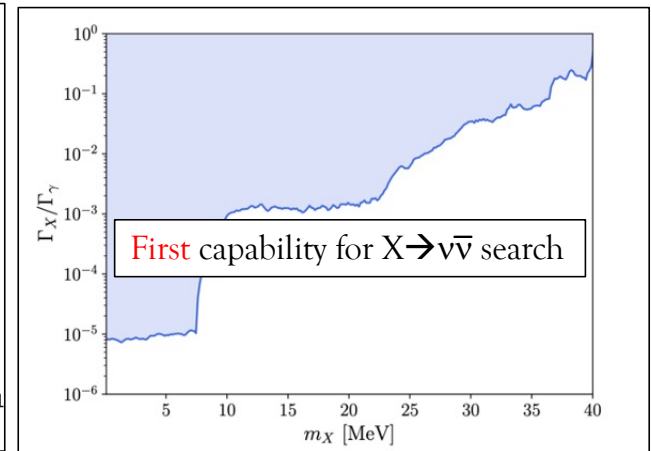
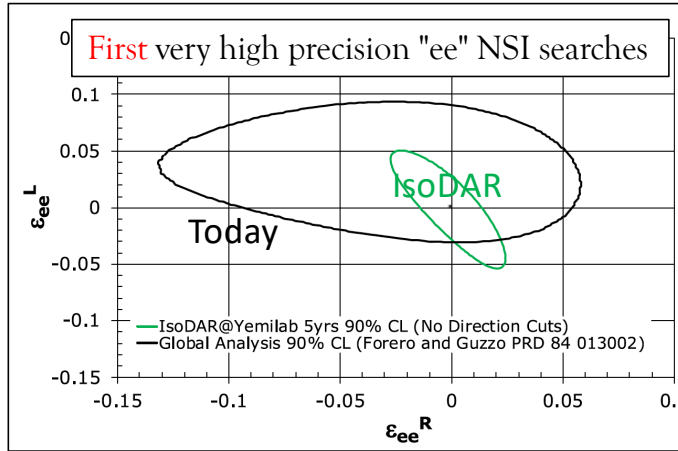
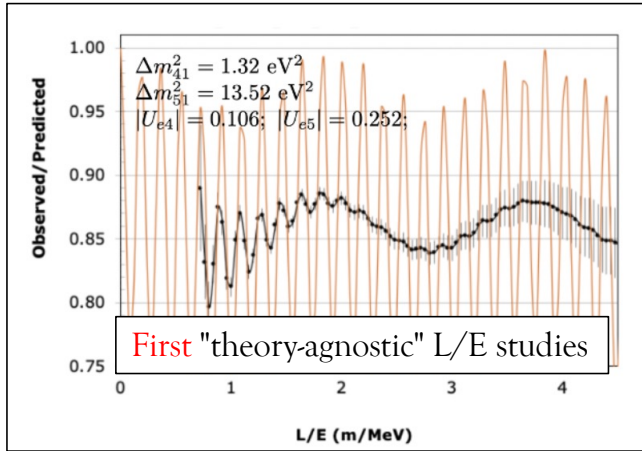
Lujan Center has floorspace for more;



this is the largest, light-only LAr detector

IsoDAR: Outside-the-box accelerators → Outside-the-box BSM searches

What's unique? Producing a mole of $\bar{\nu}_e$ next to a multi-kt detector → Worlds largest IBD and ES interaction samples!



First Ultra-High Intensity Underground Accelerator

The next intensity frontier is underground!

And...

First low-Q accelerator-measure of $\sin^2\theta_W$,

Closing the QCD Axion window at 1 MeV,

Order of magnitude improvement on mirror neutron search

....See NF03 study for more

In Beyond-Standard-HEP accelerators move Beyond-Standard-Model physics forward.

Conclusion: Please assure these opportunities are part of the US mission through comment in your report.