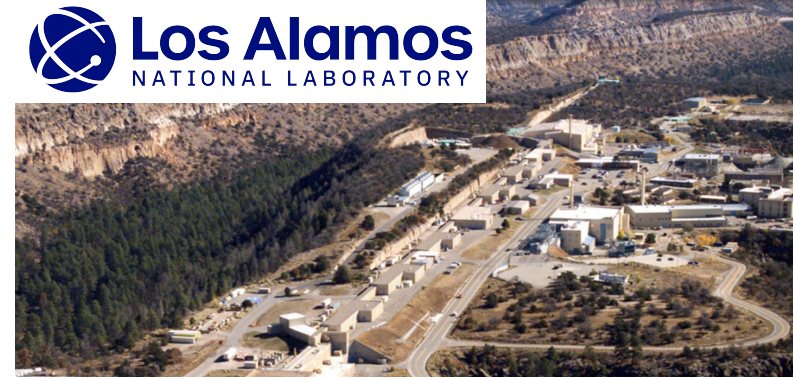


Austin Schneider^{†1} on behalf of the Coherent CAPTAIN Mills Collaboration

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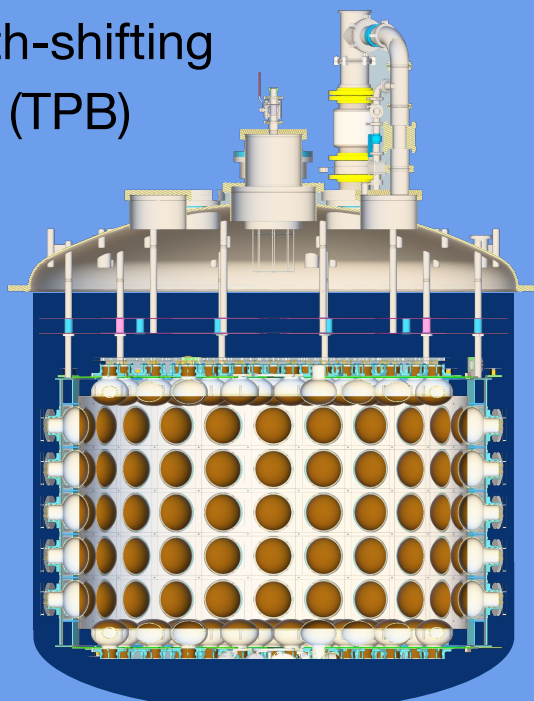
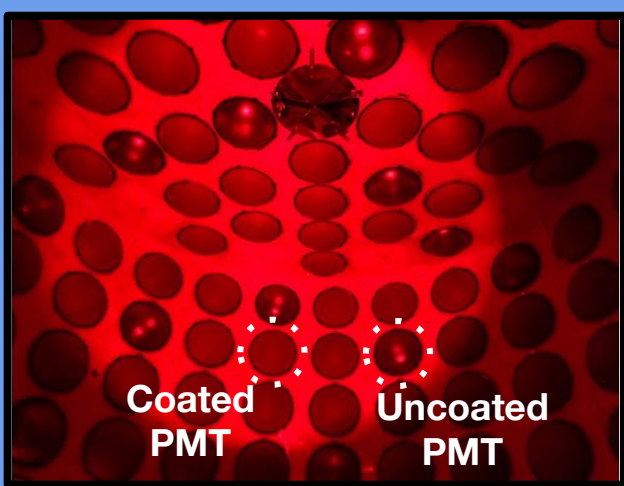
The Coherent CAPTAIN-Mills (CCM) experiment

- 10 ton liquid argon scintillation and Cherenkov detector
- Located at Los Alamos Neutron Science Center (LANSCE)
- Sensitive to **MeV-scale dark sector physics!**



Detector

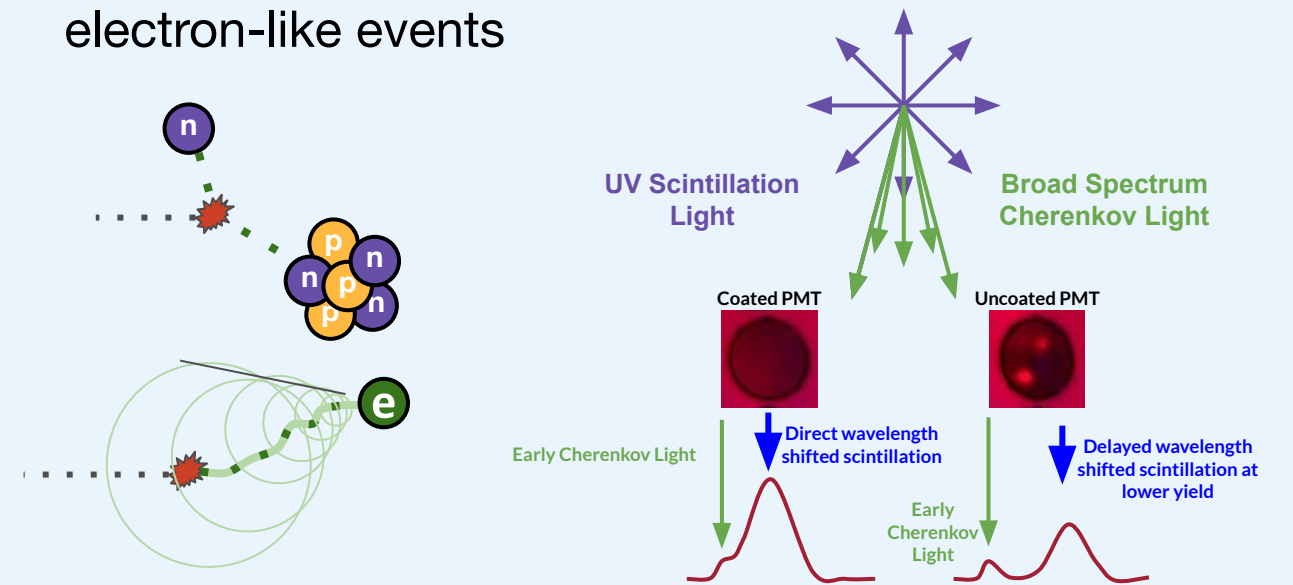
- 10 tons of liquid Argon | 7 tons interior | 3 tons veto region
- 200 8" PMTs in interior volume \Rightarrow 50% photo-coverage
- 80% of PMTs coated in wavelength-shifting 1,1,4,4-Tetraphenyl-1,3-butadiene (TPB)



- 2ns timing resolution

Light collection

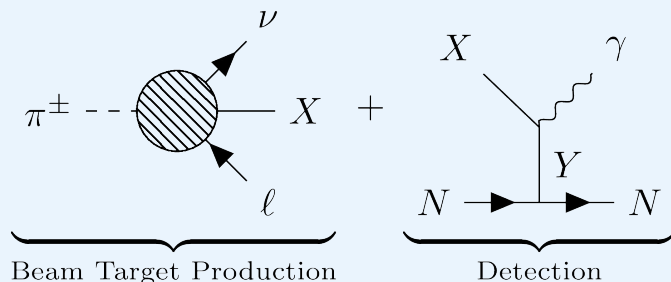
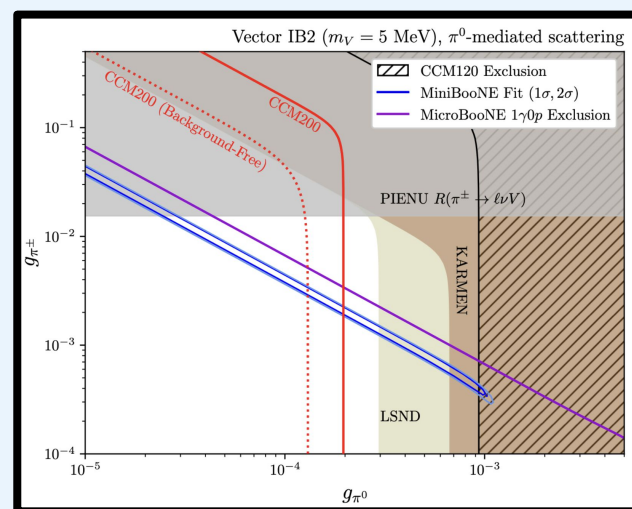
- Mix of coated and uncoated PMTs improve PID
- Isolate broad-spectrum Cherenkov light on uncoated PMTs
- Provides a handle for differentiating nuclear-recoil-like and electron-like events



Dark Sector Coupling to Meson Decay

PhysRevD.109.095017

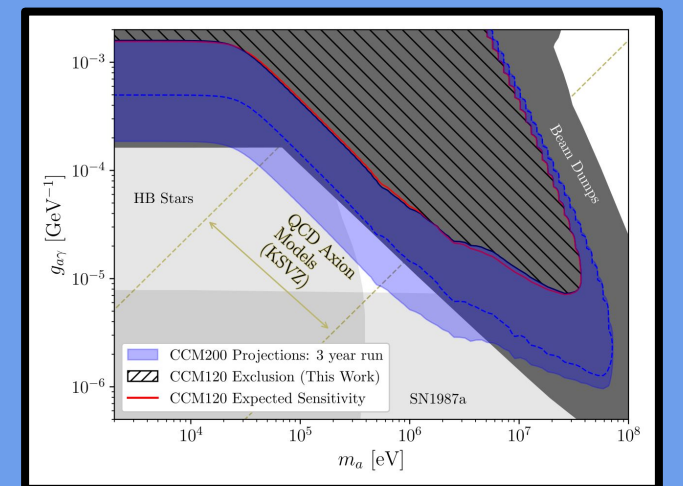
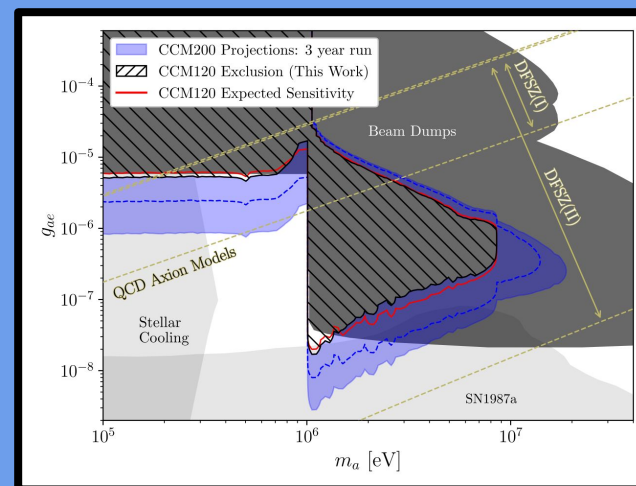
- Possible MiniBooNE excess explanation
- Rare 2-body neutral pion decay to photon and bosonic long-lived particle (LLP)
- Production of LLP from the three-body decay of the charged mesons
- Photoconversion of the LLP



Axion Like Particles (ALPs)

PhysRevD.107.095036

- Production in Tungsten target
- Scattering on Argon nuclei or decay in detector
- High energy EM signals (1-10 MeV)

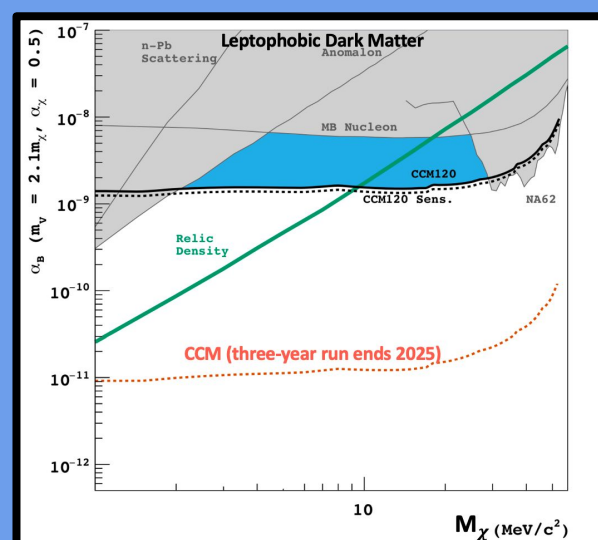
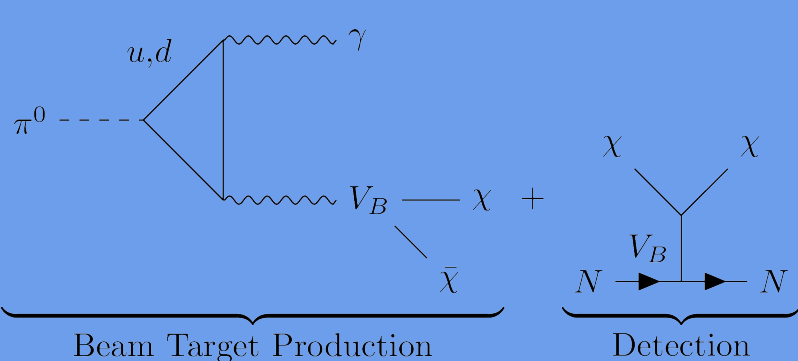


Leptophobic Dark Matter

PhysRevLett.129.021801

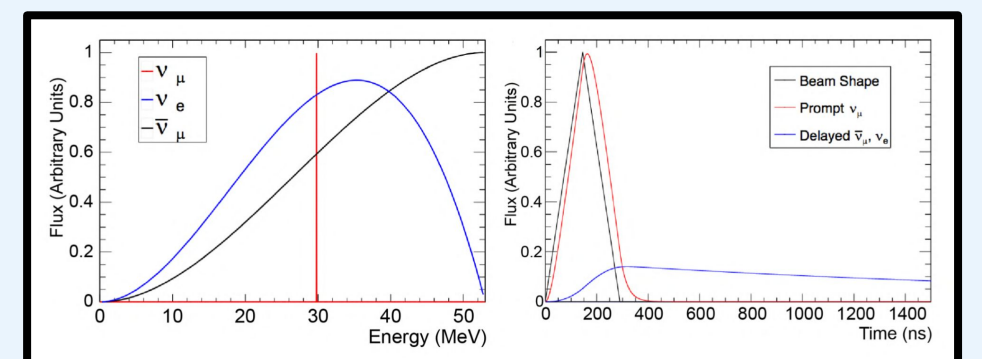
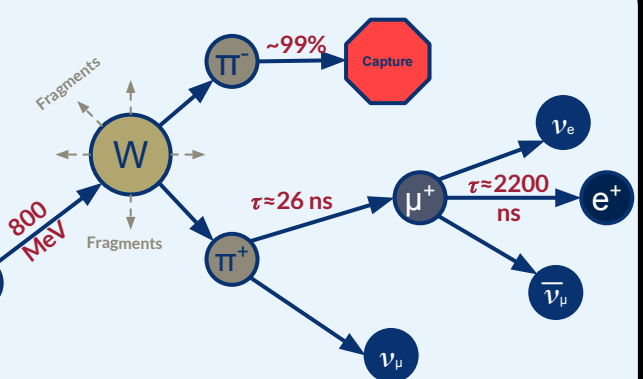
PhysRevD.106.012001

- Coupling to baryon current
- Detection through coherent scattering off Argon nuclei \rightarrow nuclear recoil



Beam

- 20 Hz | 100 μ A | 290 nsec pulse
- 800 MeV protons on W
- Pion decay-at-rest neutrinos
- Lujan target at Los Alamos Neutron Science Center (LANSCE)



References

- PhysRevD.109.095017
- PhysRevD.107.095036
- PhysRevLett.129.021801
- PhysRevD.106.012001

Acknowledgments

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