

Low Energy Electron Recoil Searches in LZ

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LZ Experiment

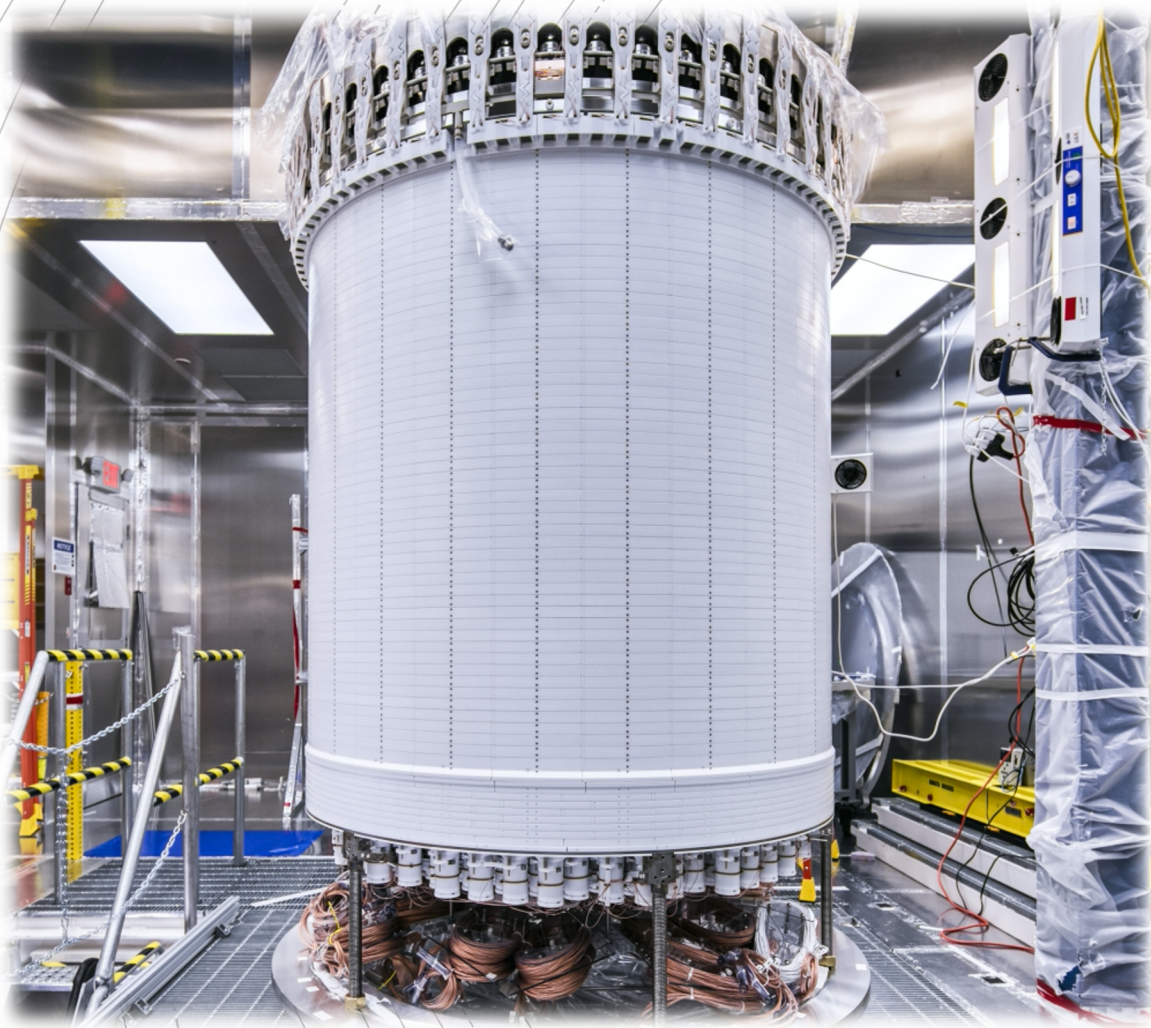


Image Credit: Matt Kapust (SURF)

Next
generation
direct
detection

Dual
phase Xe
TPC

7 tonne LXe

SURF South
Dakota

LZ at
1480m
depth

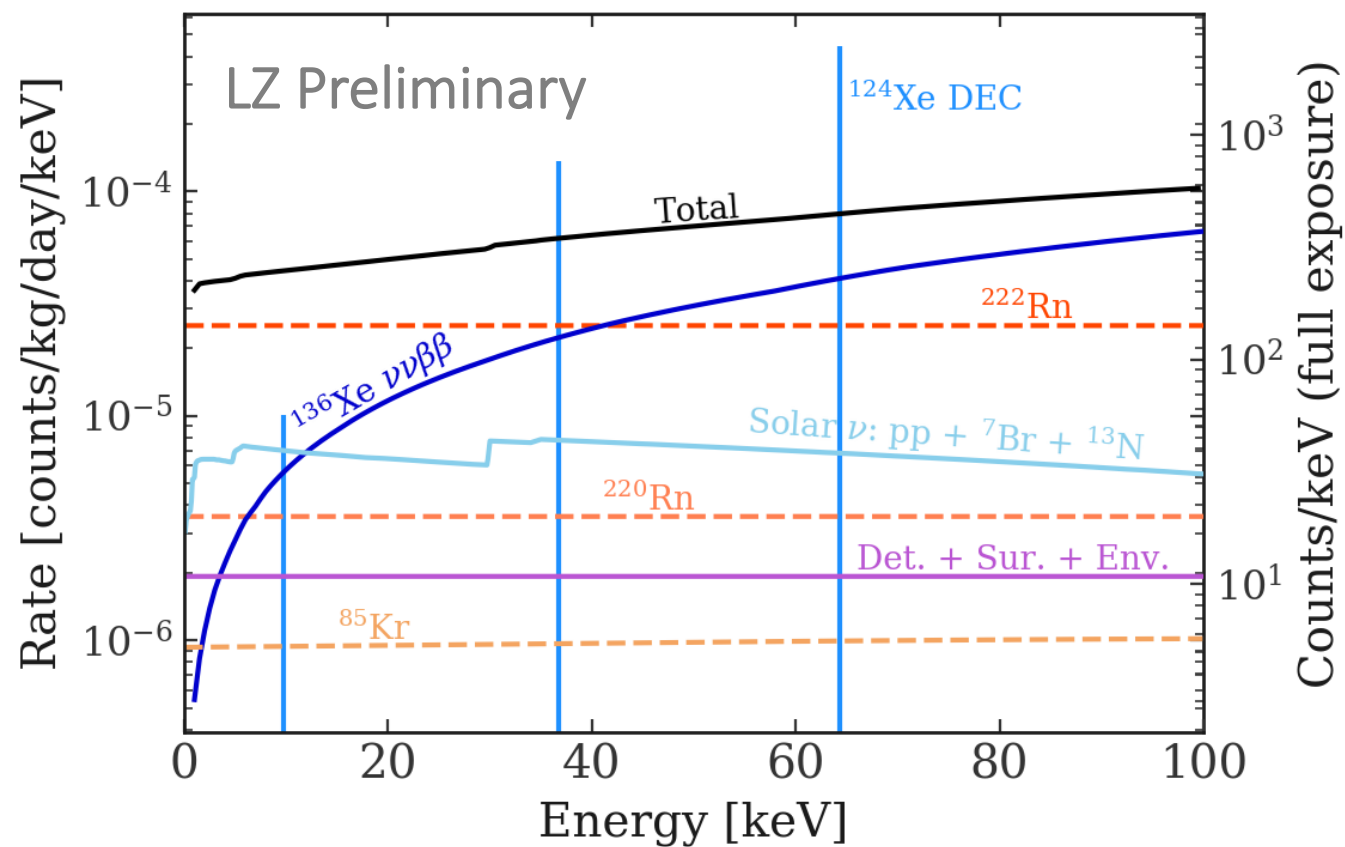
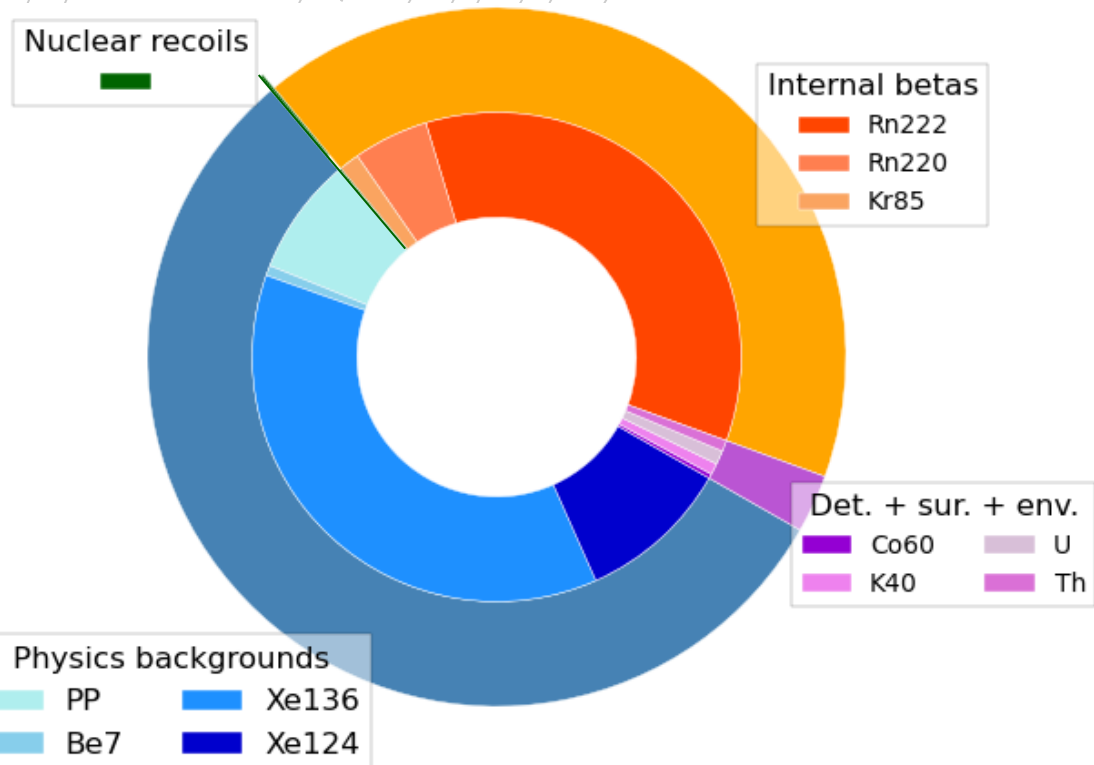


First
science
data
early
2021

Expect factor ~40
improvement in
WIMP sensitivity

[arXiv:1802.06039](https://arxiv.org/abs/1802.06039)

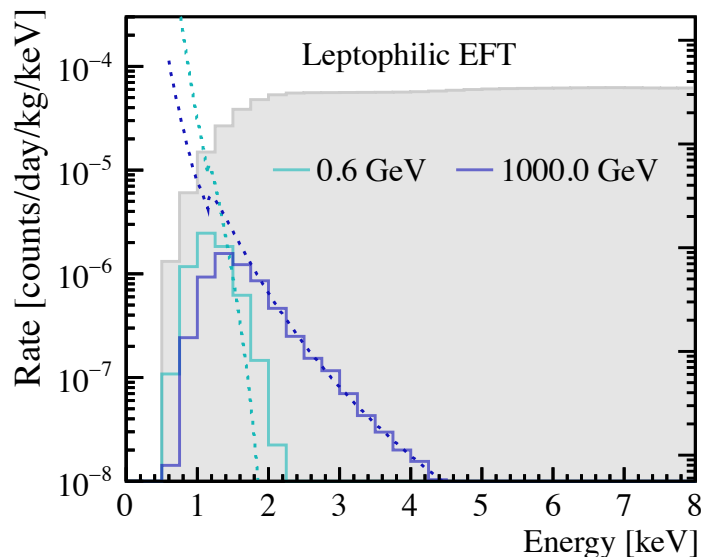
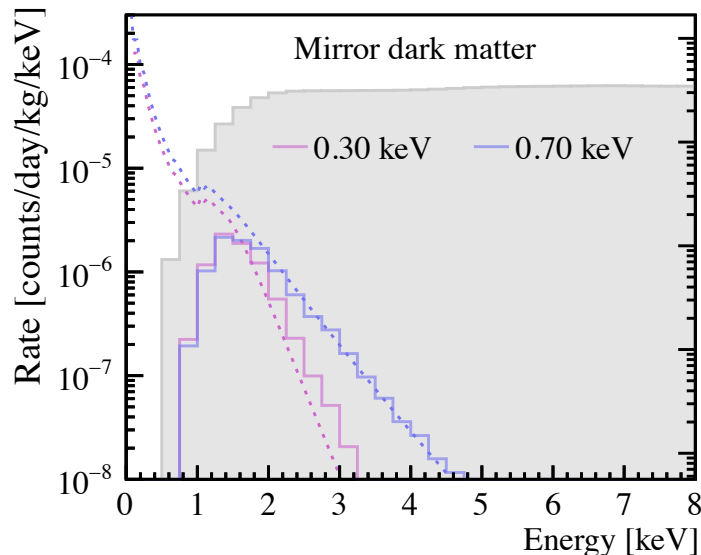
Expected Backgrounds



Signal Models

Hidden
(mirror)
sector **DM**

[[arxiv:1401.3965](https://arxiv.org/abs/1401.3965)]

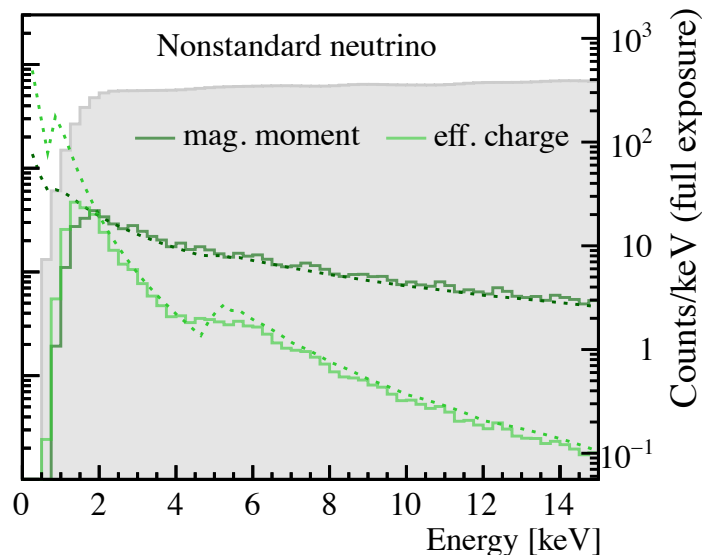


DM which
couples to
leptons

[[arxiv:0907.3159](https://arxiv.org/abs/0907.3159)]

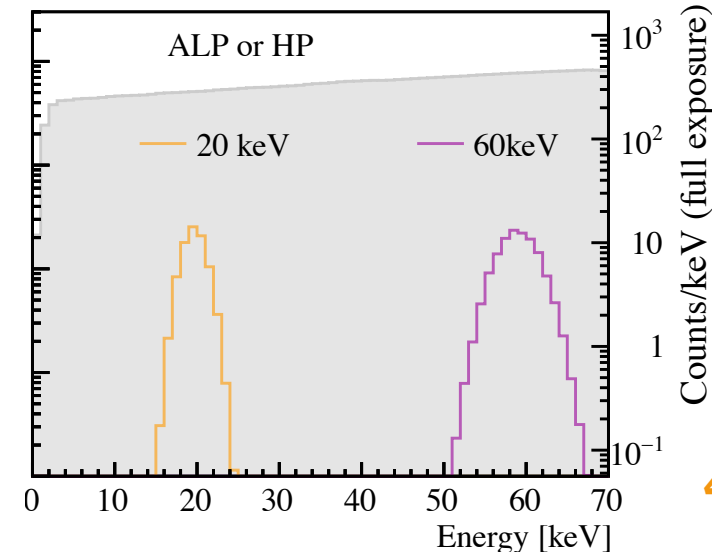
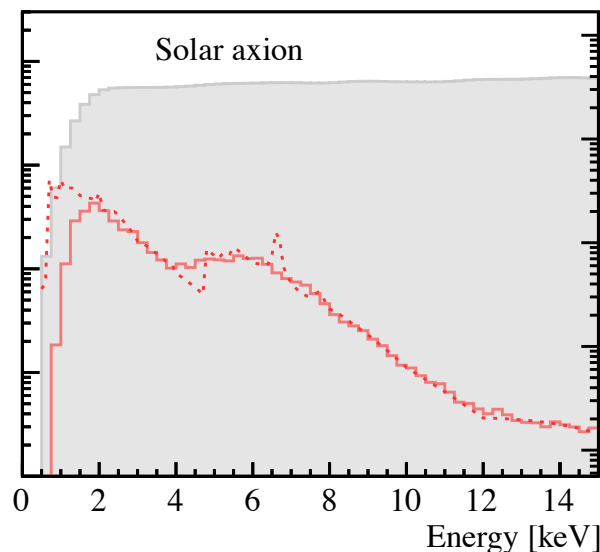
BSM physics

- Anomalous neutrino interactions [[arxiv:1903.06085](https://arxiv.org/abs/1903.06085)]
- Additional bosons – solar axions [[arxiv:1310.0823](https://arxiv.org/abs/1310.0823)]



LZ Preliminary

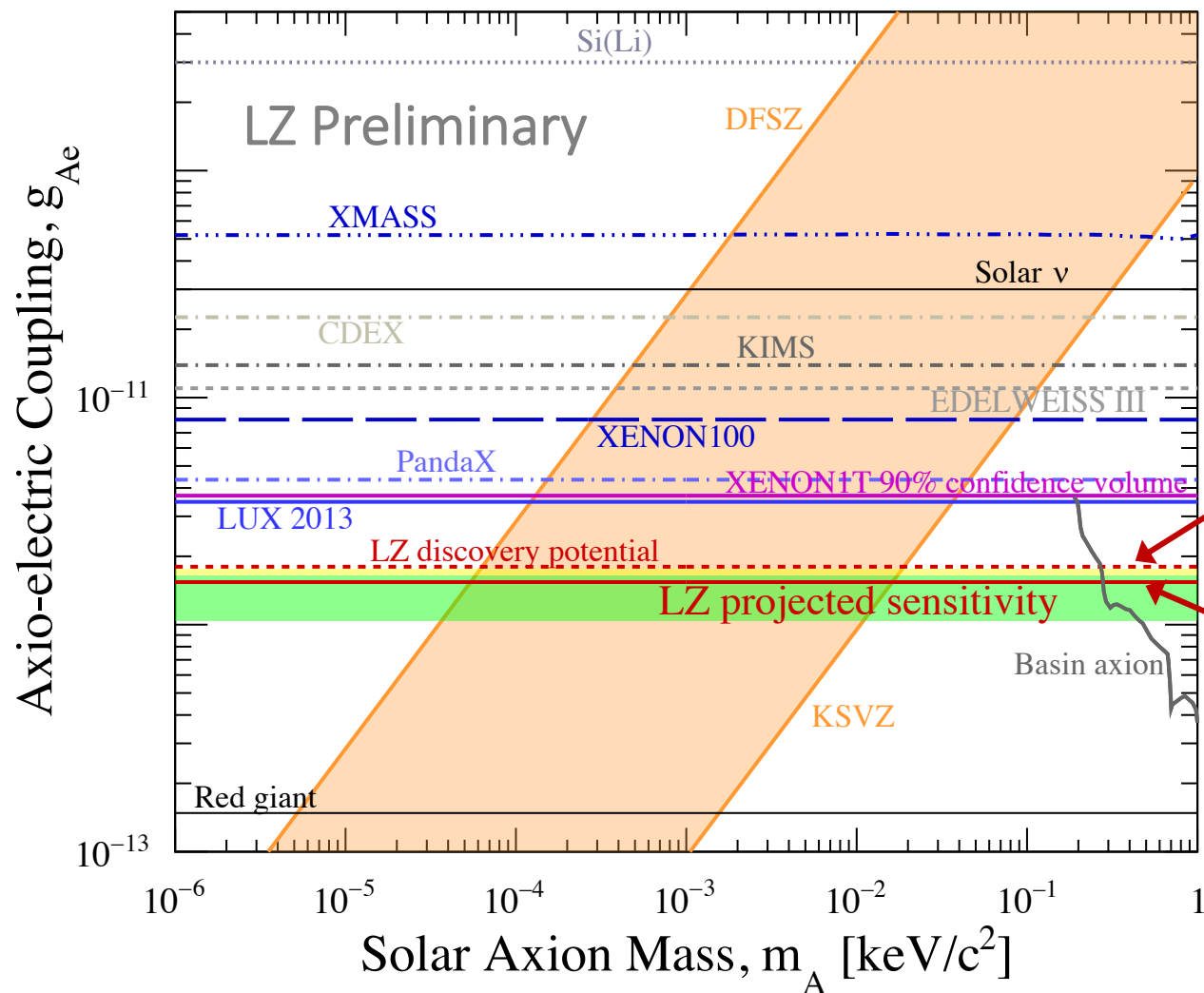
Axion like particle or
hidden photon **DM**
[[arxiv:0807.3279](https://arxiv.org/abs/0807.3279)]



Projected Sensitivity

Expect world leading limits for all signal models.

Solar axion:



Projected 3σ
discovery potential

Projected 90%
confidence limit

Summary

- Direct detection experiments sensitive to low energy ERs predicted by non-WIMP DM models and BSM physics
 - Solar axion
 - Nonstandard neutrino interactions
 - Mirror dark matter
 - Leptophilic EFT (AV coupling)
 - Axionlike particle and hidden photon
- LZ expects world leading sensitivity to all of these in the relevant parameter space.