



The LZ Dark Matter Experiment

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SDSM&T

On Behalf of the LZ Collaboration
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The LZ Collaboration

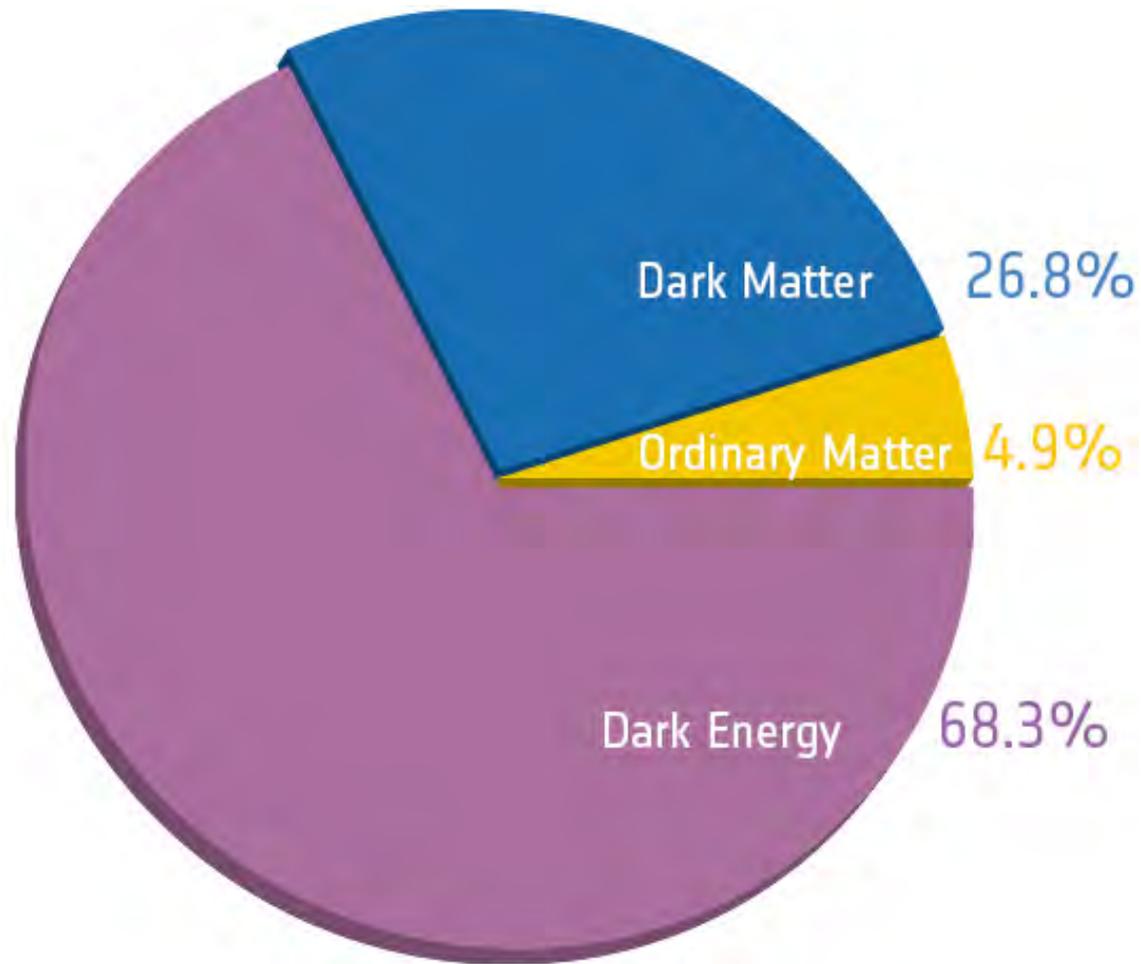
- MEPhI (Russia)
- Edinburgh University (UK)
- University of Liverpool (UK)
- Imperial College London (UK)
- STFC Rutherford Appleton, and Daresbury, Laboratories (UK)
- University College London (UK)
- University of Oxford (UK)
- University of Sheffield (UK)
- LIP Coimbra (Portugal)
- CUP (Korea)

- University of Alabama
- University at Albany SUNY
- Berkeley Lab (LBNL)
- UC Berkeley
- Brookhaven National Laboratory
- Brown University
- University of California, Davis
- Fermi National Accelerator Laboratory
- Lawrence Livermore National Laboratory
- University of Maryland
- Northwestern University
- University of Rochester
- University of California, Santa Barbara
- **University of South Dakota**
- **South Dakota School of Mines & Technology**
- **South Dakota Science and Technology Authority**
- SLAC National Accelerator Laboratory
- Texas A&M
- Washington University
- University of Wisconsin
- Yale University

31 Institutions internationally



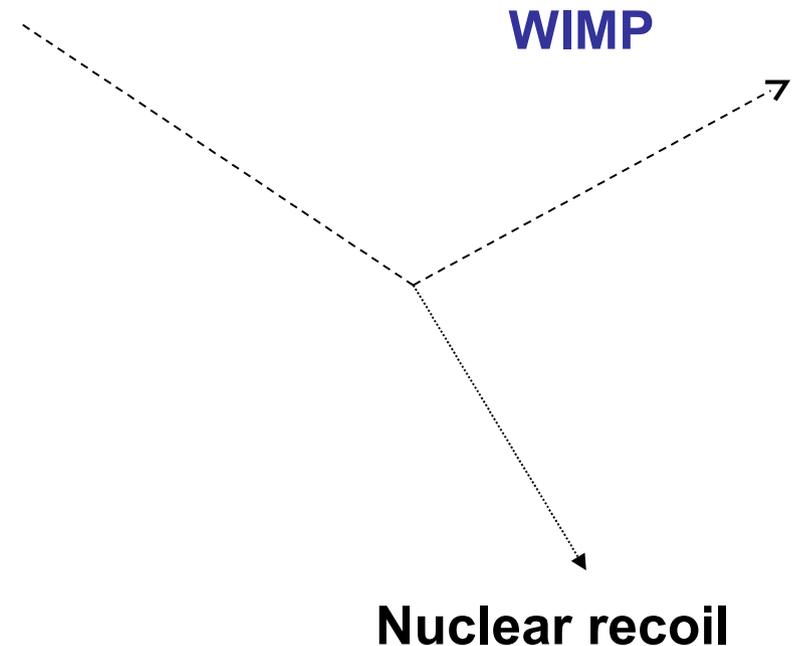
Dark Matter





Dark Matter

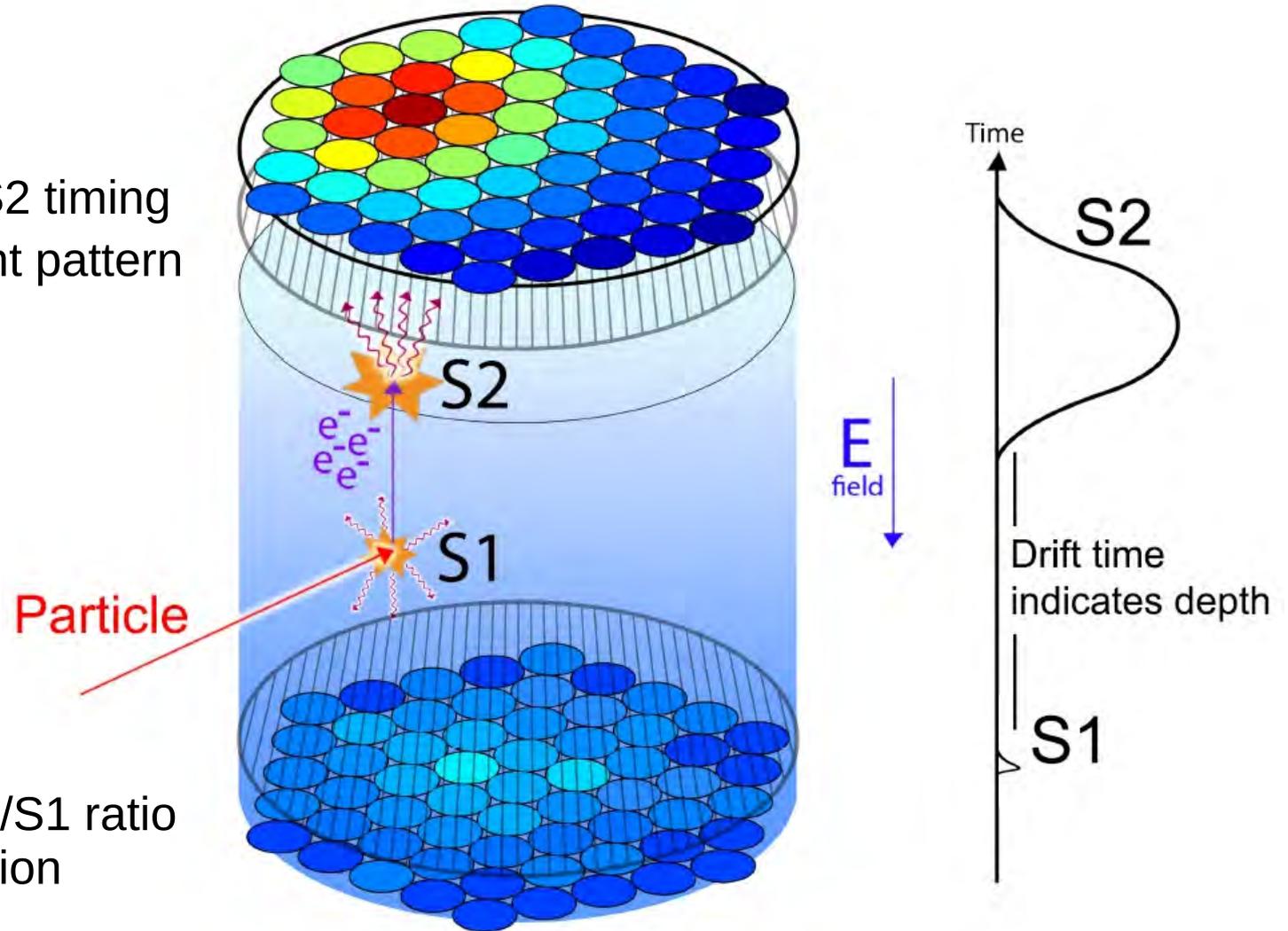
- Considerable gravitational evidence
- Leading candidate is new particle: WIMP
- Look for (rare) interaction with nucleus





LZ Detector

Z position from S1 – S2 timing
X-Y positions from light pattern



Particle

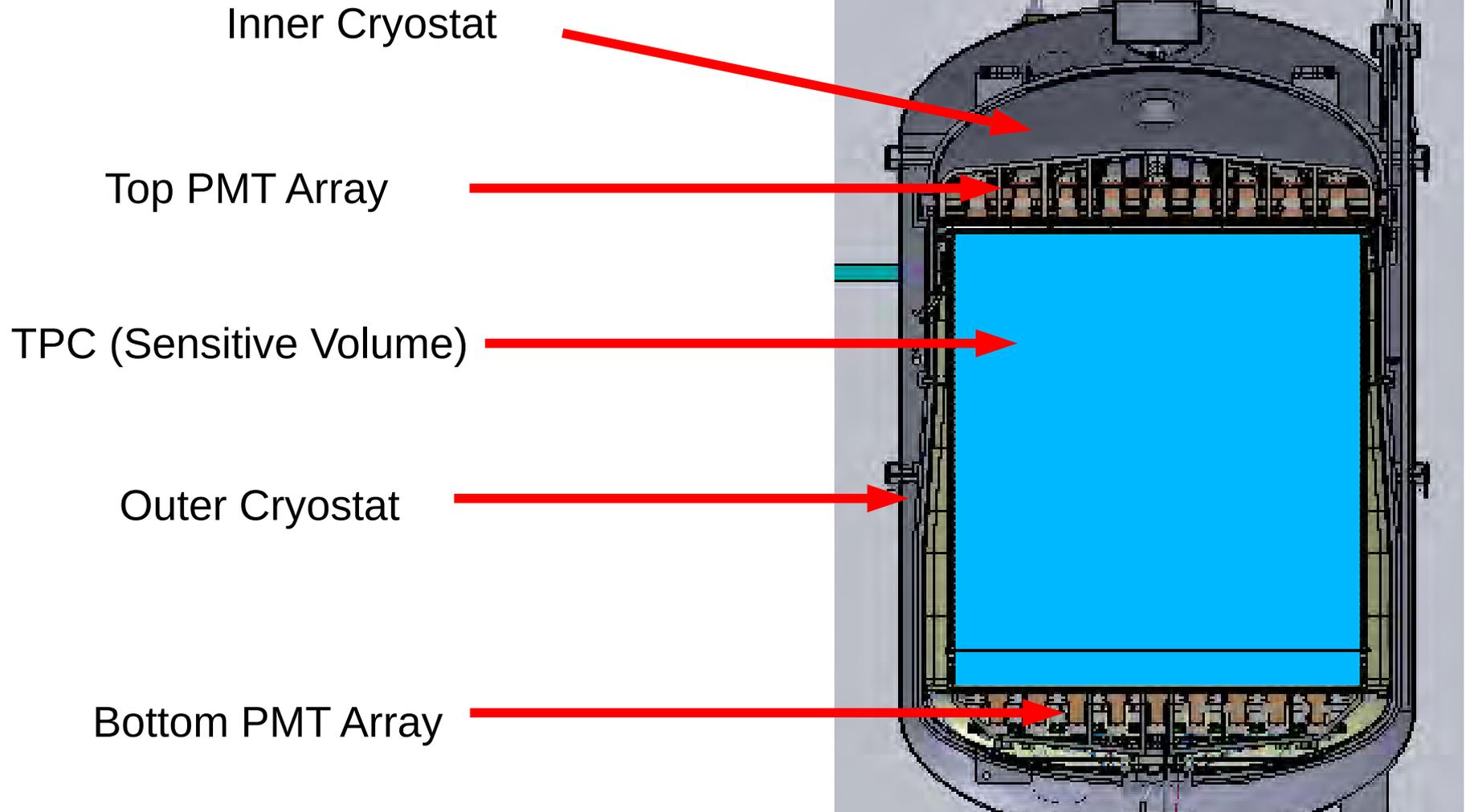
Reject gammas by S2/S1 ratio
Expect > 99.5% rejection

- ionization electrons
- UV scintillation photons (~ 175 nm)

Image by CH Faham (Brown)

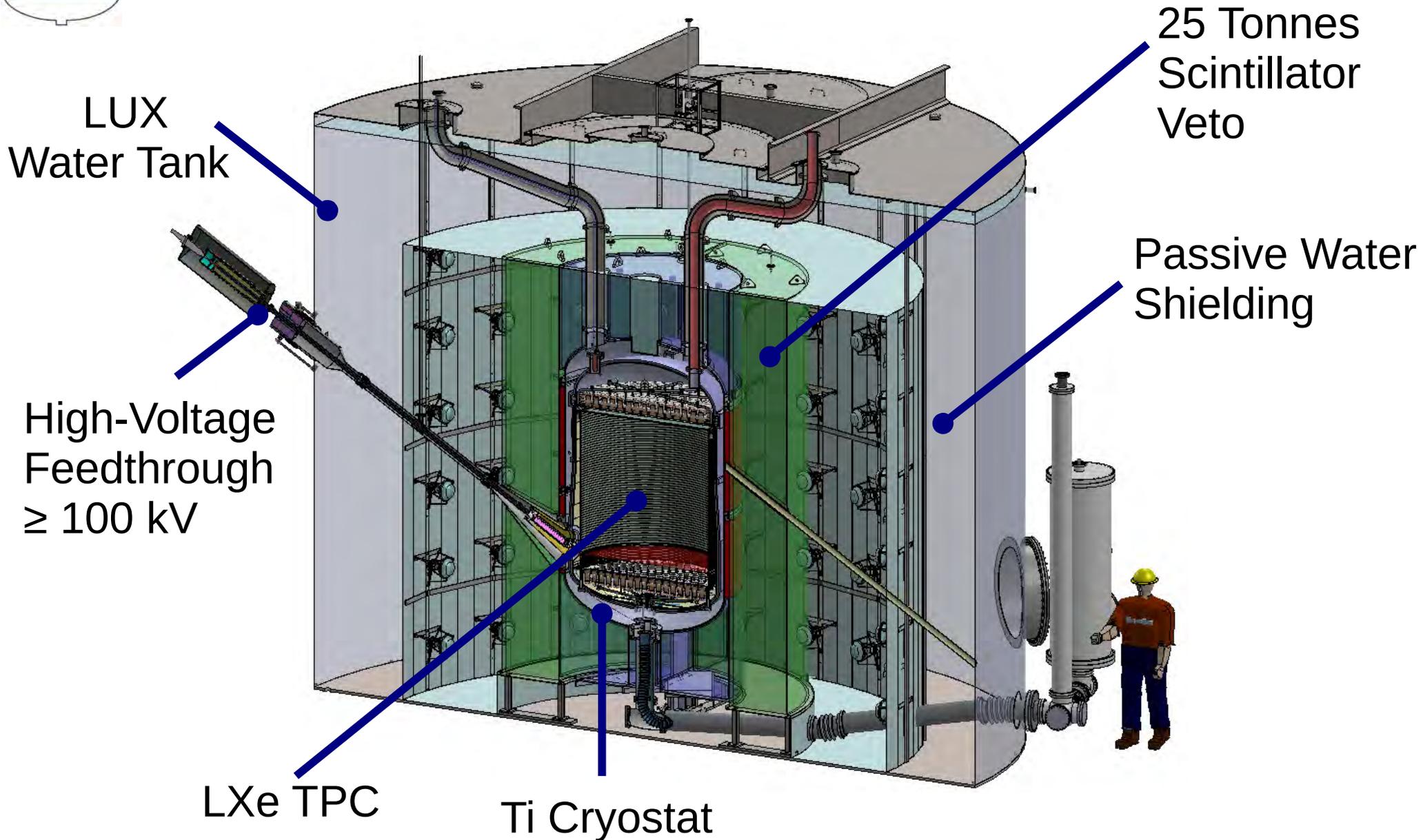


LZ Detector





LZ Detector





LZ Located at SURF



Located in the Davis Cavern
4850' level in Homestake Mine, SD

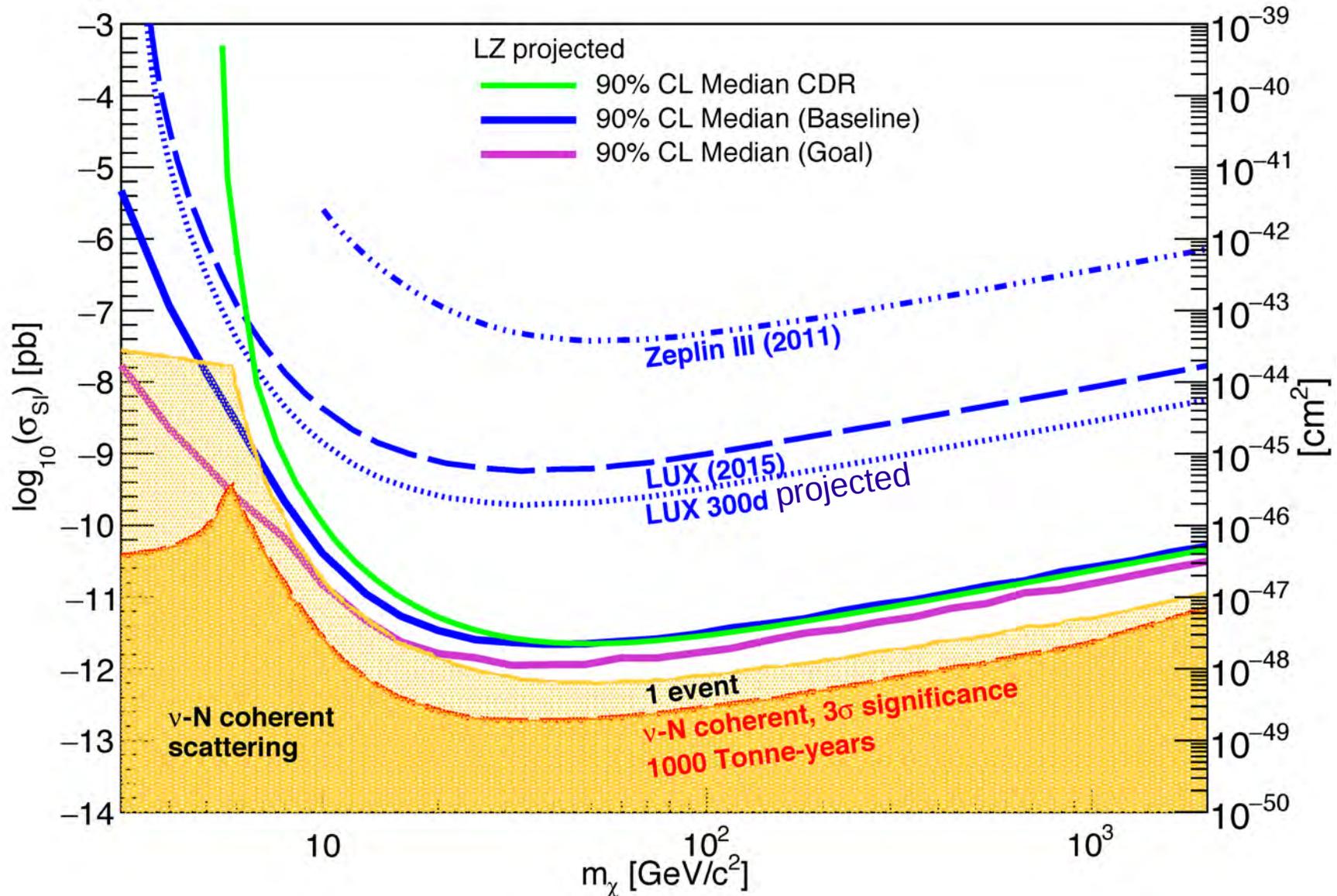


LUX to be removed
in early 2017
Water tank will
remain



Projected Sensitivity

After 1000-day exposure





Timeline

<u>Year</u>	<u>Month</u>	<u>Activity</u>
2012	March	LZ (LUX-ZEPLIN) collaboration formed
2012	May	First Collaboration Meeting
2012	Sept	DOE CD-0 for G2 dark matter experiments
2013	Nov	LZ R&D report submitted
2014	July	LZ Project selected in US and UK
2015	April	DOE CD-1/3a approval - similar in UK Beginning procurements(Xenon, PMT, cryostat)
2016	April	DOE CD-2/3b approval; baseline; all fab starts
2017	June	Begin preparations for surface assembly at SURF
2018	July	Begin underground installation
2019-2020		Begin commissioning



Summary

- LZ Project progressing on-schedule
 - Long lead-time item procurement underway: Xenon, PMTs, Cryostat, etc.
 - Materials screening programme well underway
 - Preparing now for CD-2 Review
- Expecting to begin Dark Matter search around 2020



Thank you!

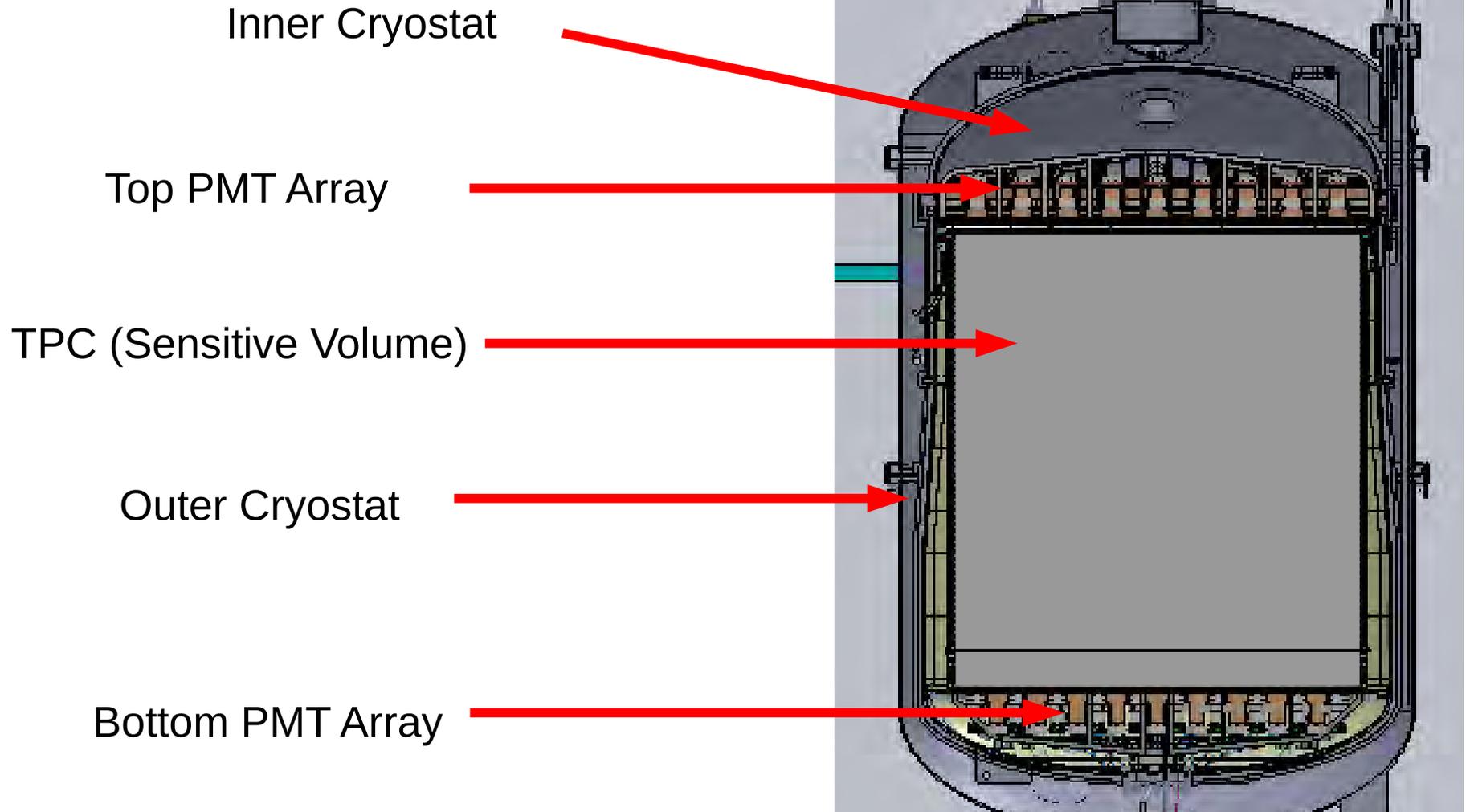




Backup Slides....



LZ Detector



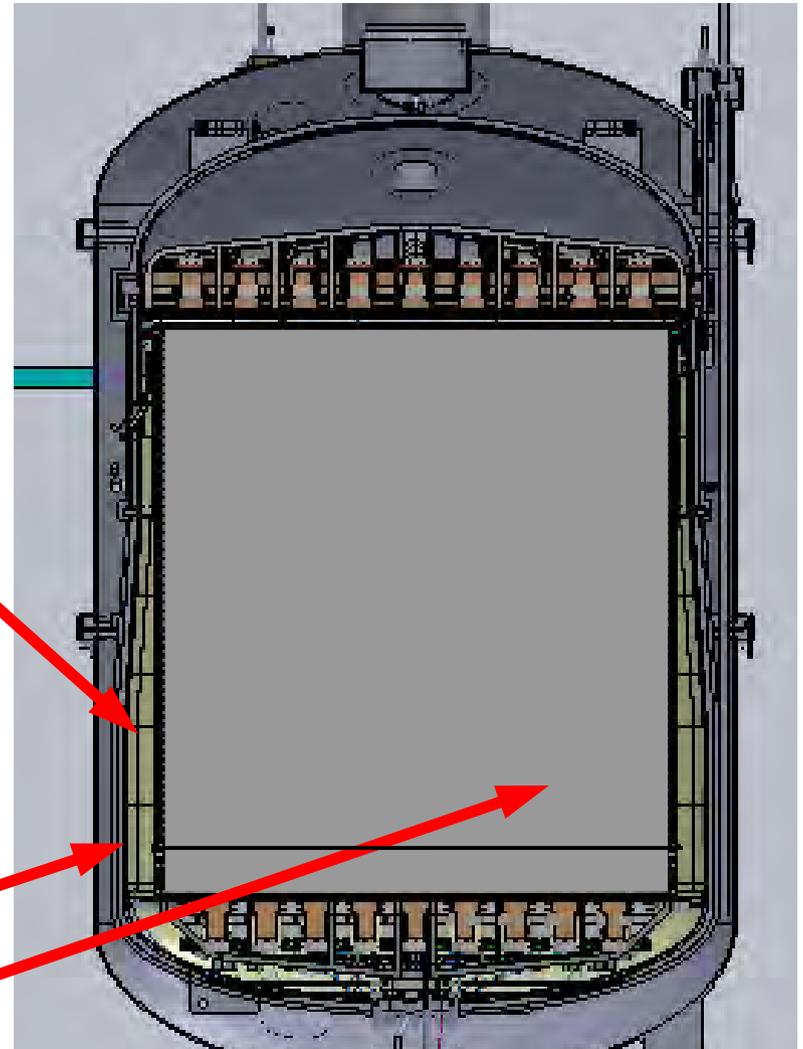


Skin Veto

- Thin layer of LXe between TPC, cryostat walls
 - Called “skin”
- Instrumented with 192 PMTs to provide Veto signal

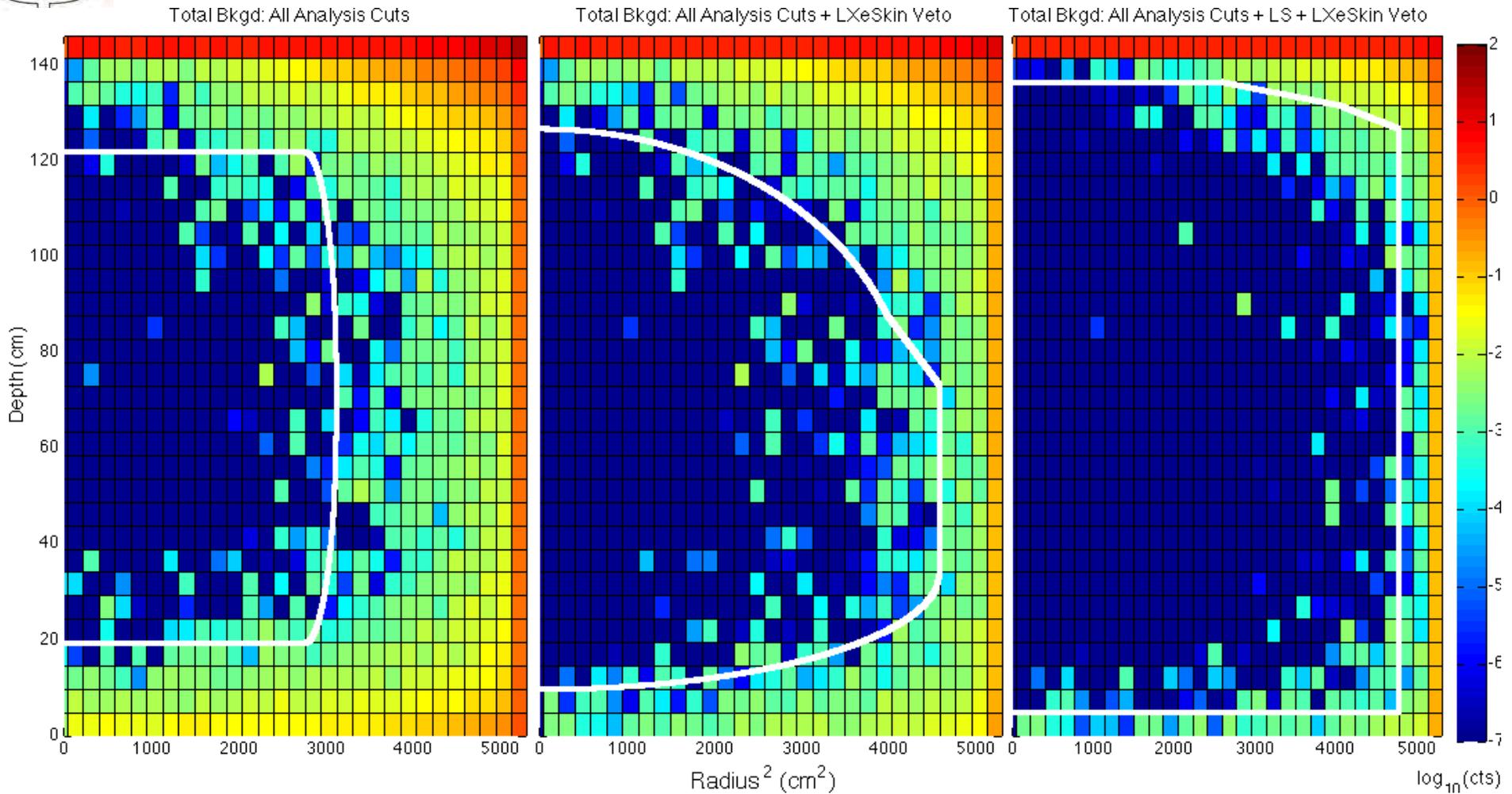
Inner Cryostat Wall

TPC





Expected Fiducial Volume



No Veto:
2.8 Tonne

Skin Veto:
4.1 Tonne

+ Scintillator Veto:
5.6 Tonne



LUX-ZEPLIN

