Early Screening Plans at DUSEL With Ultra-Low Background Counting Consortium (ULBCC)

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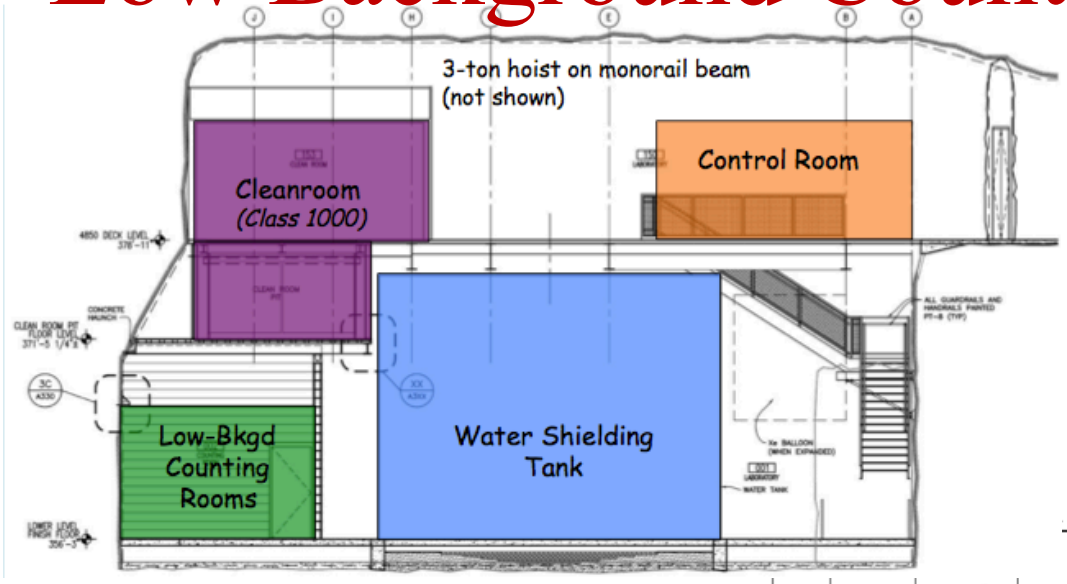
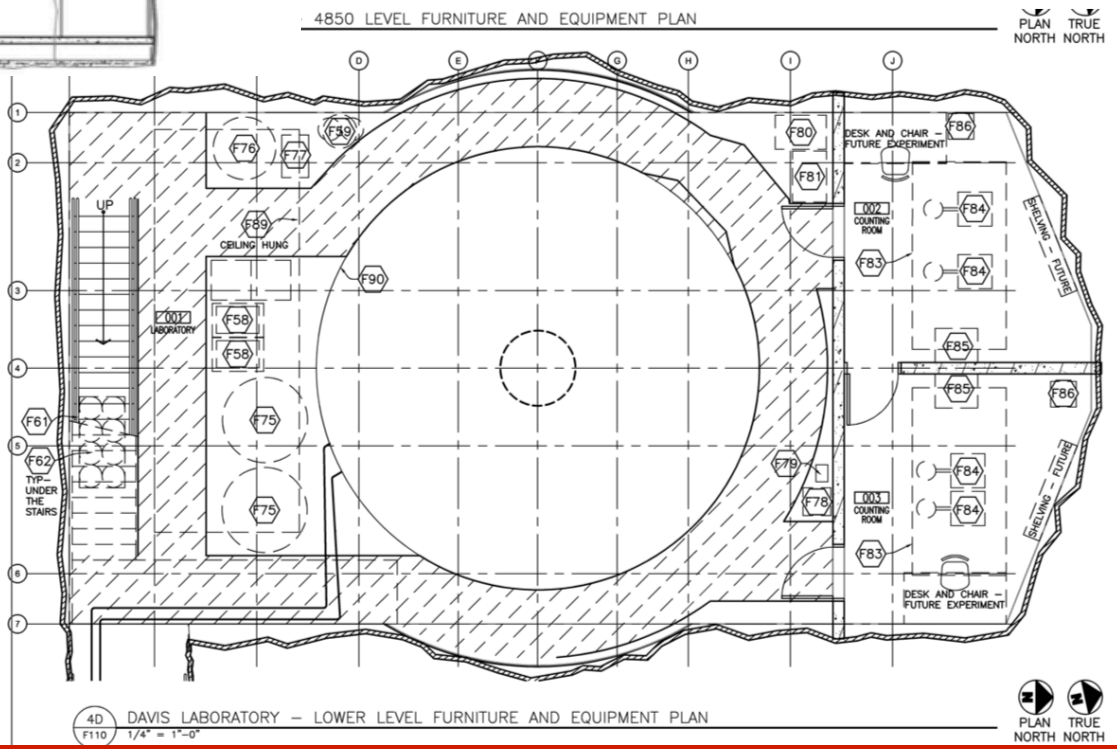
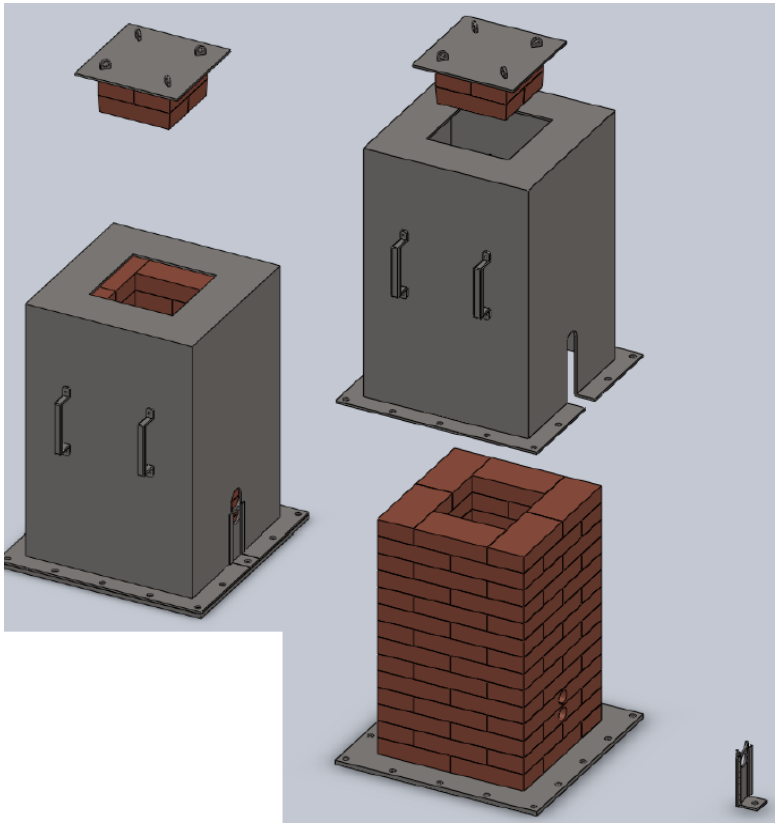
For AARM Collaboration

Low Background Counting at Sanford Lab

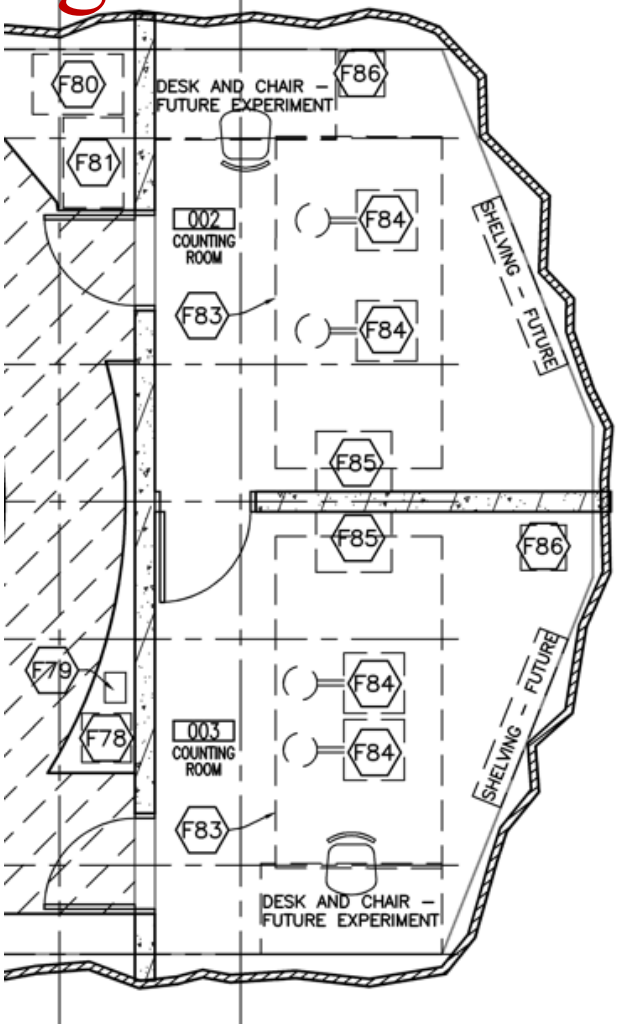




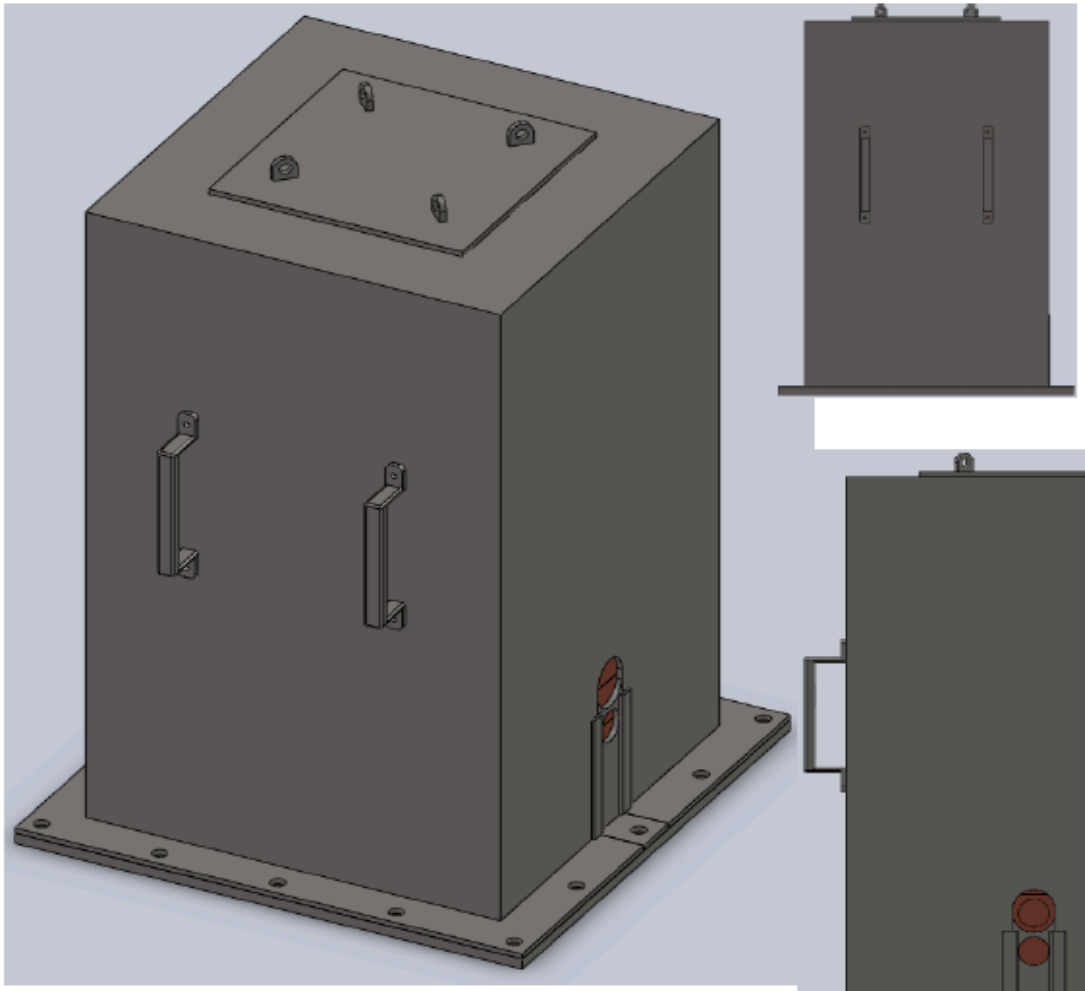
Low Background Counting at Sanford Lab



Prototype Rn-exclusion shield is built at USD for use with already purchased HPGE detector. Shield will incorporate an inner layer of OHFC copper, stainless steel radon-exclusion box, and outer layer of lead.



Space reserved for low-background counting with HPGE detectors in the LUX refurbishment of the Davis Cavern on the 4850L. The Davis Cavern is currently under construction.



Stainless Steel 'box'

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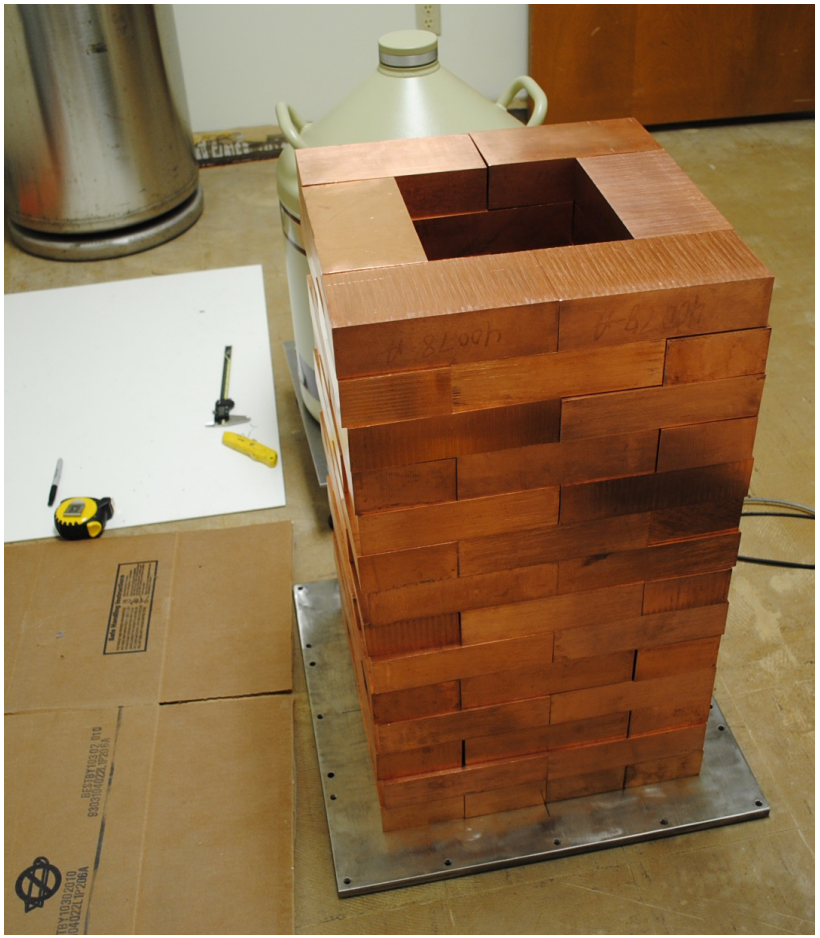
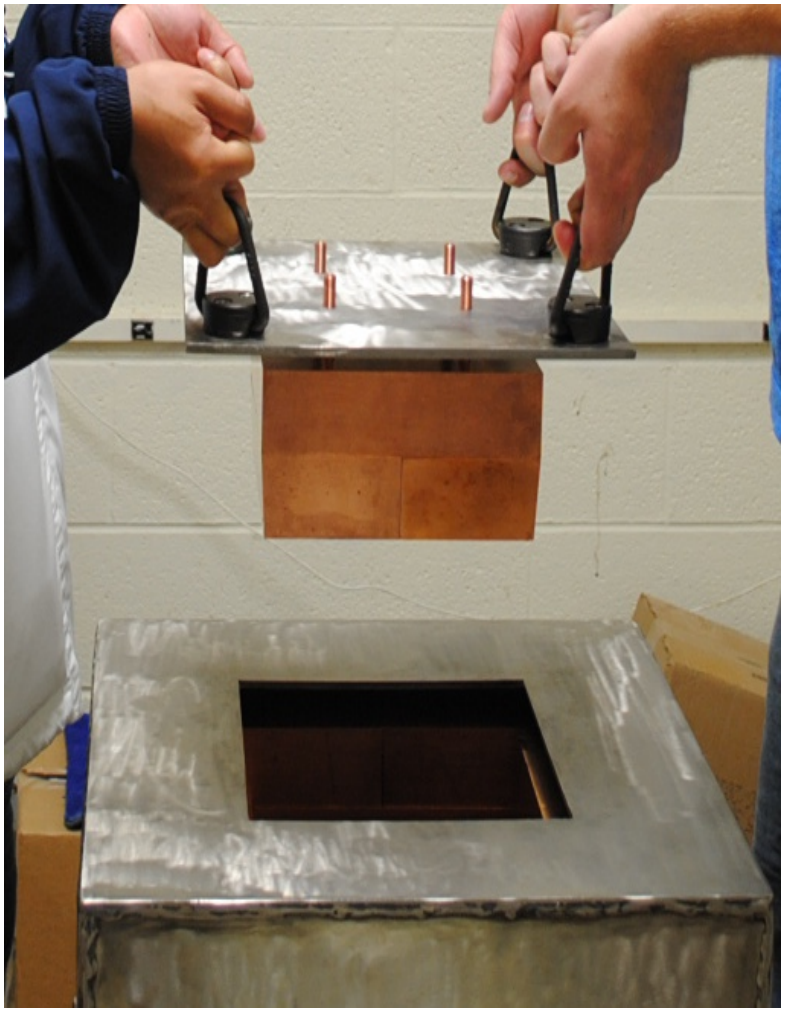
This is just to provide a few comments and kind of explain our use for this.
For detailed dimensions please reference the attached Solidworks Files.

Building the counting station at USD

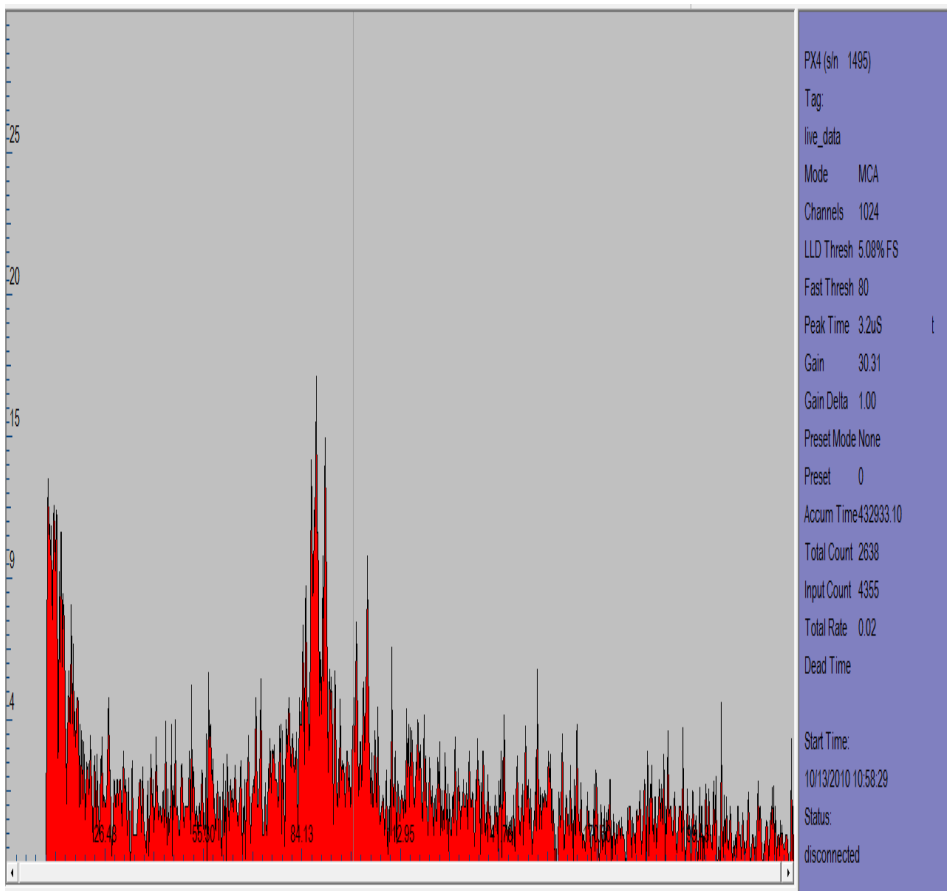


Building the counting station at USD

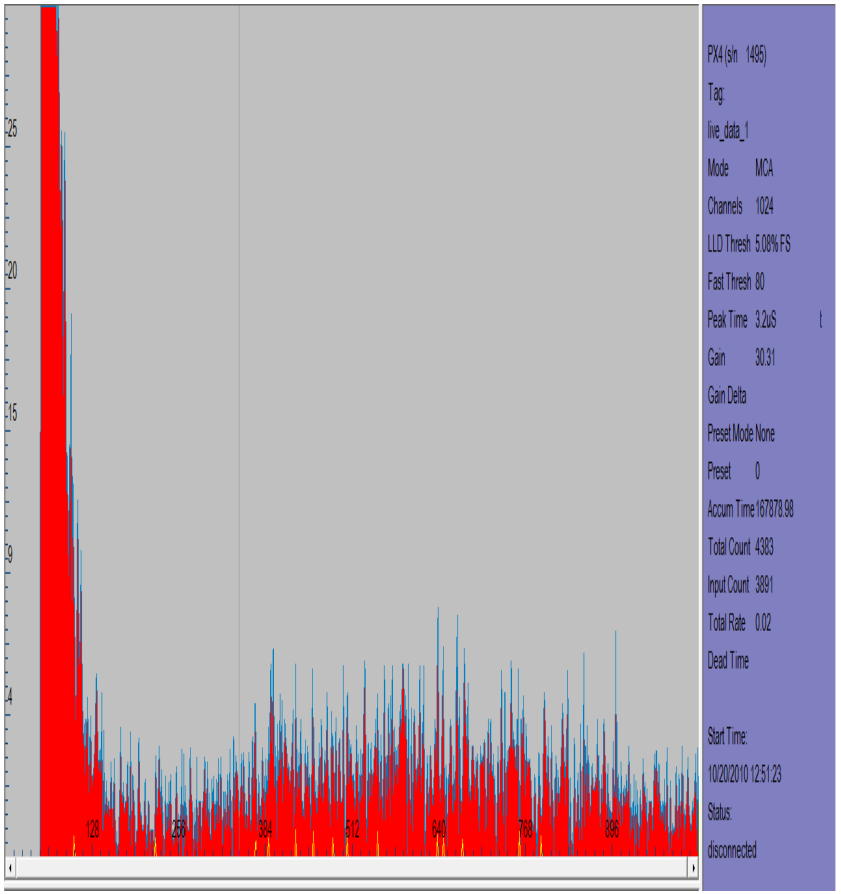


Why copper as the inner shield?

Lead house

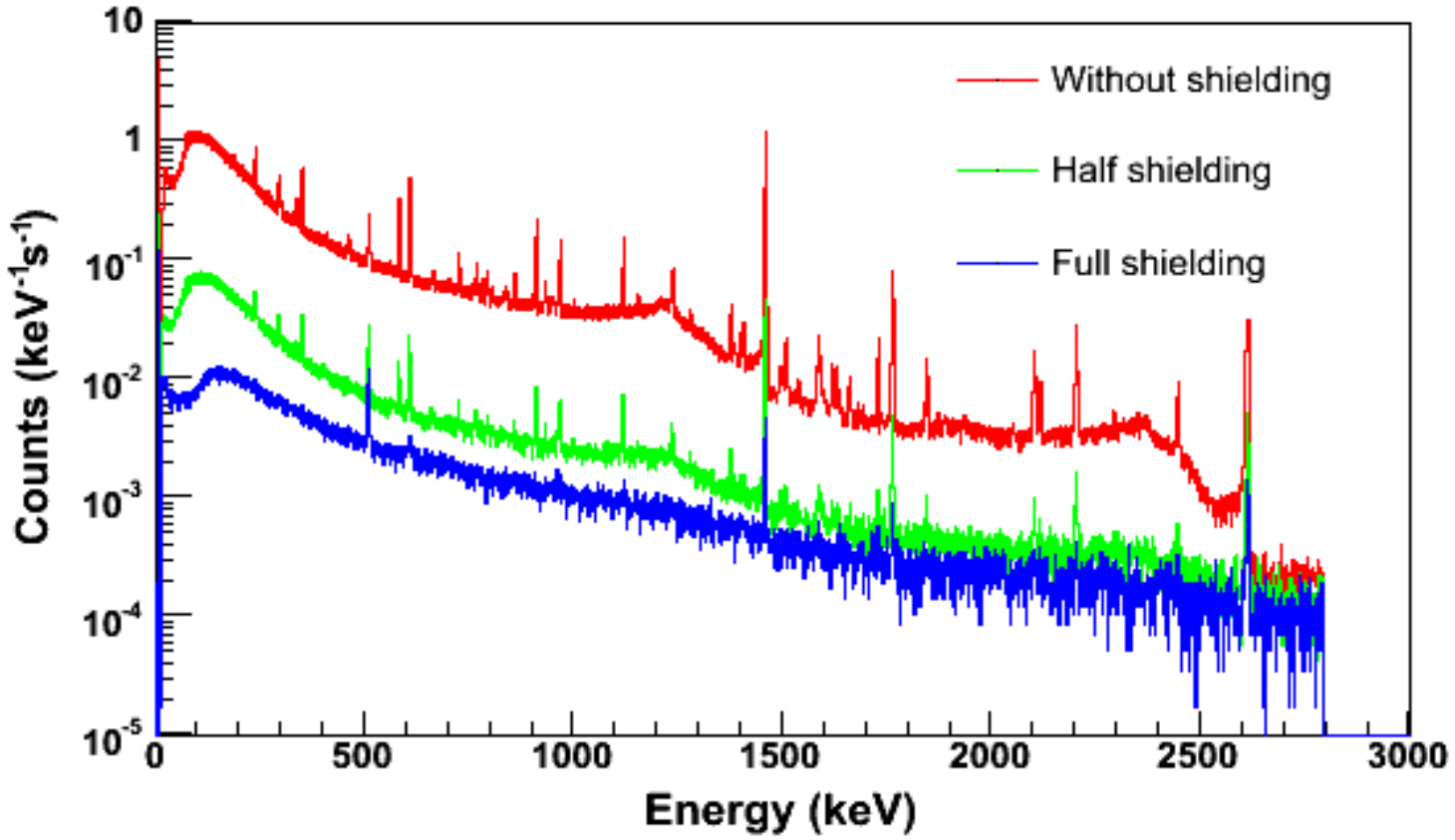


Copper house



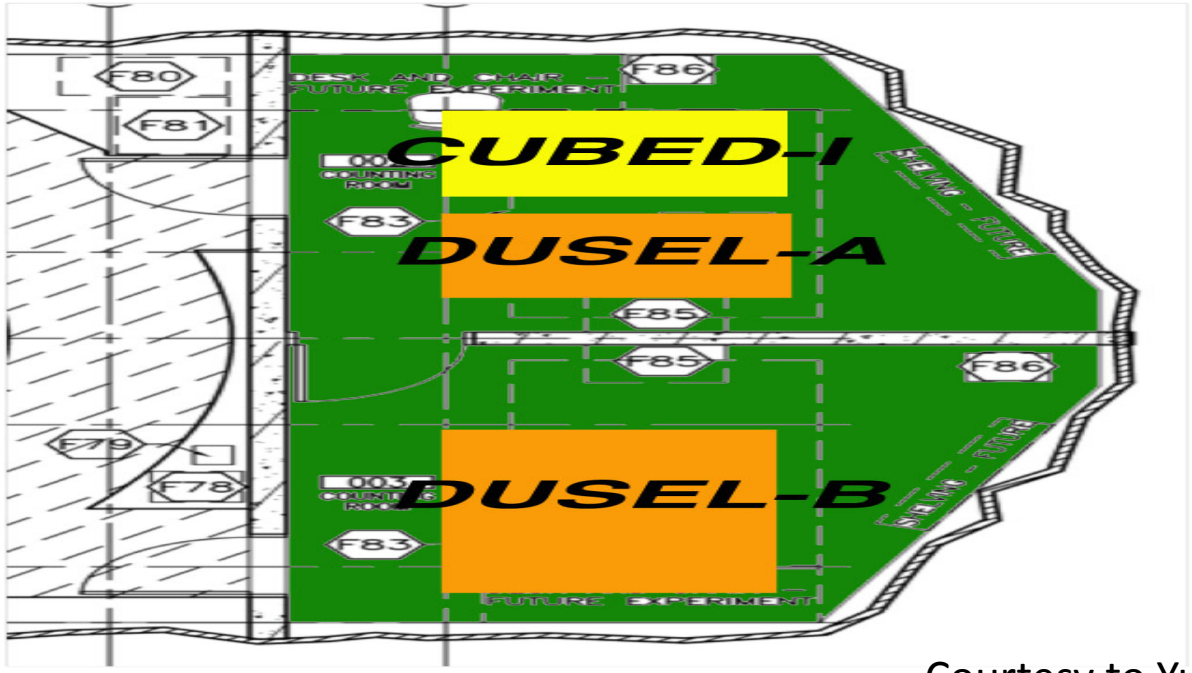
Count rates on the surface

1. Without shielding: 286.44 CPS, without lid shielding: 19.92 CPS, Full shielding: 4.88 CPS



Screening plans (Yuen-Dat Chan)

1. CUBED-1 will be built at Sanford Lab in Oct. of 2011, ~ppb level sensitivity
2. CUBED-2 will be added in 2012, ~ppb level sensitivity
3. DUSEL-A: will be built in 2012, sub ppb level sensitivity
4. DUSEL-B: will be build between 2013 – 2014, ~ppt level sensitivity



Courtesy to Yuen-Dat Chan, LBL

ULBCC Milestones
Phase I (2010-2013)

2010- 2011	• Construct commercial available screeners at Sanford Lab • Begin the study of the shielding against radioactivity and muon-induced background for various low background experiments utilizing the commercial available screeners • Complete Monte Carlo simulation codes and make a detailed comparison with the experimental data • Design and optimize the shield at USD • Implement the database for background characterization • Purchase the first HPGe crystal and design cryostat for GeMPII-like detector
2011- 2012	• Ongoing comprehensive experimental site background study • Refine detailed design for the ultra-low background counting facility • Purchase the second HPGe crystal • Study intrinsic backgrounds from detector components • Continue cryostat design • Start material screening for the planned DUSEL experiments
2012- 2013	• Continue comprehensive experimental site background study and the construction of the shielding including a radon purge system in the clean room • Complete the ultra-low background facility construction at Homestake mine or Soudan site • Continue materials screening for incoming DUSEL experiments • Continue the study of the shielding and veto against muon-induced processes

ULBCC Milestones
Phase II (2014-2015)

2013- 2014	• Continue comprehensive experimental site background study and the construction of the shielding including a radon purge system in the clean room • Start materials screening with GeMPII-like screeners • Continue materials screening for incoming DUSEL experiments • Continue the study of the shielding and veto against muon-induced processes
2014- 2015	• Continue comprehensive experimental site background study and the construction of the shielding including a radon purge system in the clean room • Continue materials screening with GeMPII-like screeners • Continue materials screening for incoming DUSEL experiments • Continue the study of the shielding and veto against muon-induced processes • Start the design for ultra-sensitive screener with CLOVER-type segmented detector