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Exchanging and Collecting Data: Facilities to Support Next Generation Experiments

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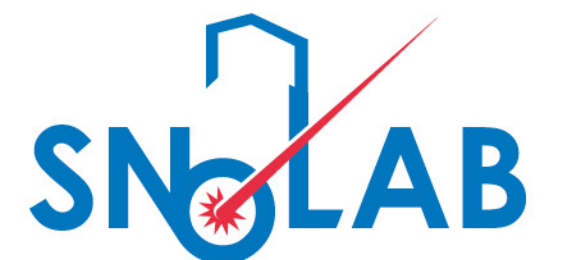
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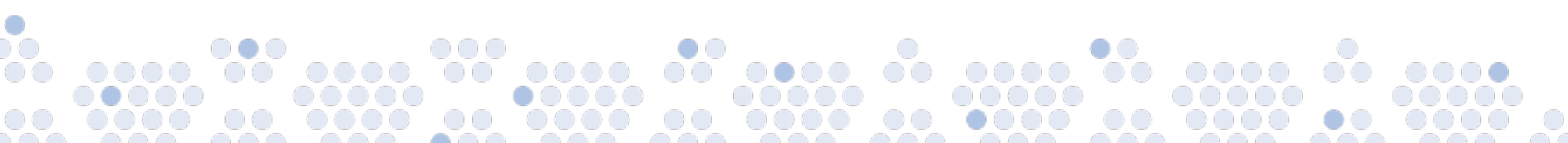


Expectations

Expected Outcome: By the end of this discussion

- produce a list of possible areas of collaboration;
- identify key challenges for each area; and
- capture any comments that would be relevant for a next step

To set the stage for the discussion, we will review of a couple of past efforts to collaborate on similar efforts.



Lessons from Past Efforts



- 2012 the **NSF funded** a proposal to develop integrated tools for underground science (Cushman, Cooley, Empl, Schnee).
 - Development of community-wide simulation tools;
 - Improvements to FLUKA and Geant4; Alpha-n Neutron Yield, Energy Spectra, and Neutron Interaction Cross-Sections
 - Confirmation of simulation physics models and cross sections relevant to underground science by comparing to data worldwide and supporting specific efforts in neutron benchmarking;
 - Direct Benchmarking Studies at Soudan
 - Establishment of a global materials database;
 - Radiopurity.org
 - Continuation of the very successful integration workshops centered on simulation, material screening, and underground physics.
 - **Relied many unfunded collaborators:** Daniel Akerib (LUX/LZ), Eric Hoppe (MAJORANA, SNO, KATRIN), Yuen-Dat Chan (MAJORANA, SNO, LBF), Mike Kelsey (SuperCDMS, Geant4), Manoel Couder (DIANA), Vitaly Kudryavtsev (EDELWEISS, LBNE), Adam Cox (EDELWEISS) Kevin Lesko (KamLAND, SNO), Richard Ford (SNO, DEAP) James Loach (MAJORANA), Joseph Formaggio (MiniCLEAN, KATRIN), Pia Loaiza (EDELWEISS, ILIAS), Richard Gaitskell (LUX/LZ), Marco Selvi (XENON100/XENON1T), Cristiano Galbiati (DarkSide, BOREXino), Andrew Sonnenschein (COUPP), Reyco Henning (MAJORANA, CLEAN), Mani Tripathi (LUX/LZ), Andrew Hime (CLEAN, SNO), Dennis Wright (SuperCDMS, Geant4)
 - *In summary, radiopurity.org was developed, launched and continues, several papers resulted from other studies and shared/common tools were further developed.*

Lessons from Past Efforts



- 2014 the ***DOE encouraged*** a G2 Backgrounds and Screening Working Group, Joint working group between SuperCDMS/LZ Collaborations
 - An initial meeting of the two groups exchanged information regarding capabilities of labs/institutions/universities involved in each collaboration.
 - There was some discussion of possibilities of joint efforts in simulations that would be needed.

- Outcomes from this group (based on Jodi's recollections) –
 - Each collaboration believed many of their resources to be fully subscribed for their own efforts.
 - There was reluctance to agree to share under-subscribed resources because each collaboration wanted to reserve the right to prioritize the assay their items, when needed. That left the other collaboration reluctant to commit to using the resources of the other for fear that when they needed the resource, the resource would be unavailable.
 - Development of simulations tools seemed to be experiment specific due to the differing technologies used in each collaboration. There seemed to be few areas of overlap.
 - *In summary, no significant collaboration or sharing of resources between collaborations.*

Ideas for Potential Sharing



Resource/Facility	Challenges/Advantages	Comments
Assay, Counting	<ul style="list-style-type: none"> • Messaging/funding of facilities which do not support experiment making request. • Need to develop and maintain tool for scheduling • How to prioritize requests • Who owns data? 	
Cryogenic facilities	<ul style="list-style-type: none"> • Infrastructure can go down for many months at a time, sharing cryostats could accelerate the science • Could share operational challenges/successes to improve the community performance • Wiring, geometry, performance, and backgrounds are different • Who pays labour/consumable costs? 	

