



Lawrence Berkeley National Laboratory National & Homeland Security Overview

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and LBNL POC for the CVT**



**Berkeley
Lab**

UC Berkeley

Berkeley Lab Mission



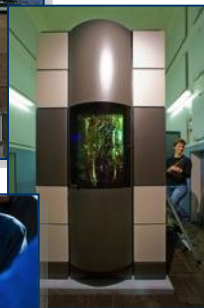
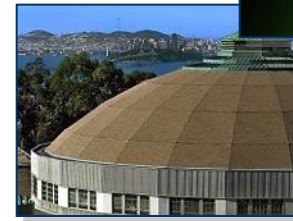
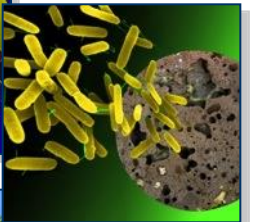
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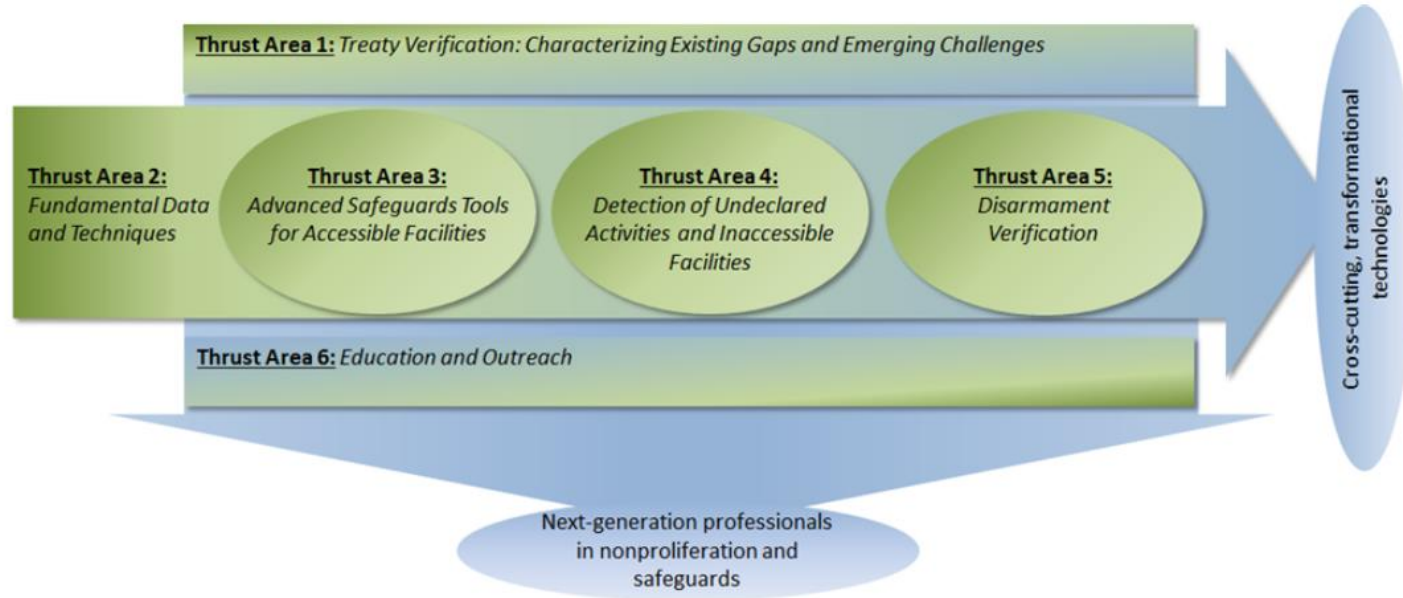
Lawrence Berkeley
National Laboratory



- **Solve the most pressing and profound scientific problems facing humankind**
 - Basic science for a secure energy future
 - Understand living systems to improve the energy supply, environment, health, and biomanufacturing
 - Understand matter and energy in the universe
- **Build and safely operate world-class scientific facilities**
- **Train the next generation of scientists and engineers**

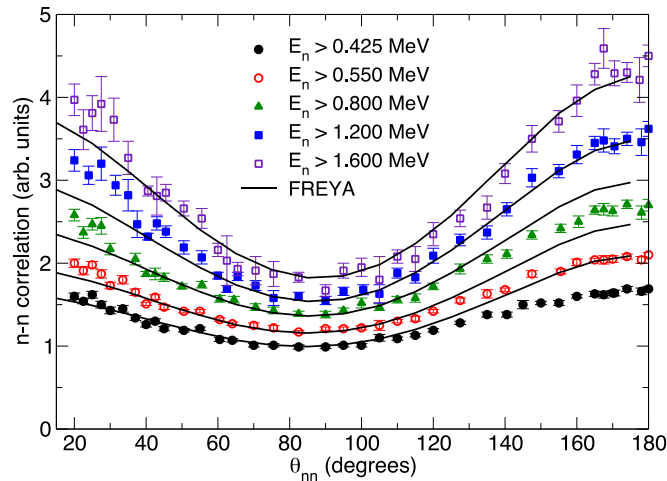


CVT Thrust Areas

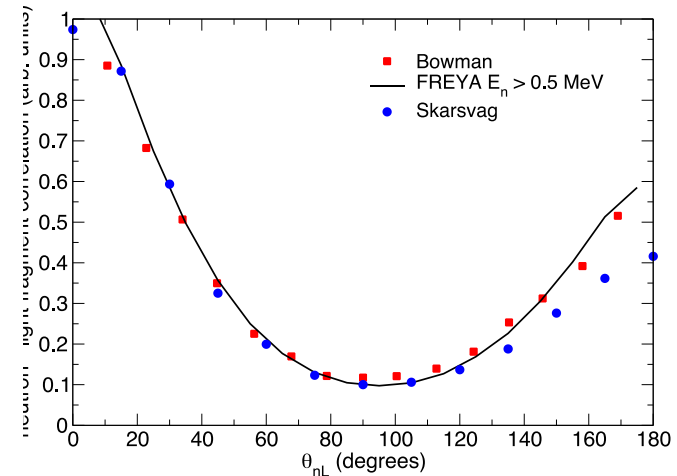


Thrust Area 2: Fundamental Data and Techniques

FREYA

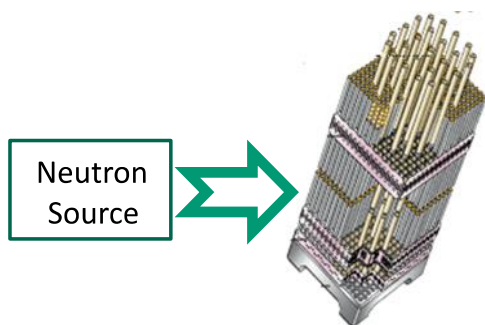


Neutron-neutron correlations

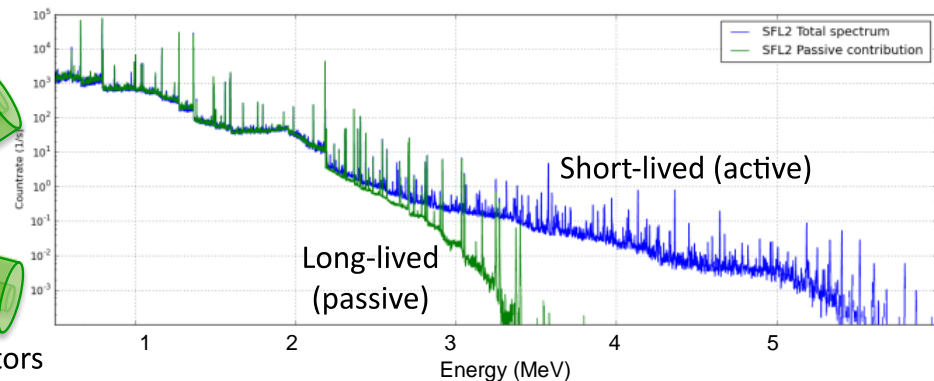


Neutron-light fragment correlations

Delayed-Gamma NDA of Spent Fuel



Detectors



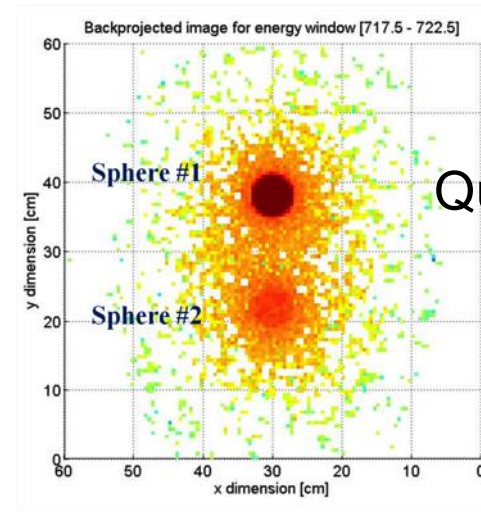
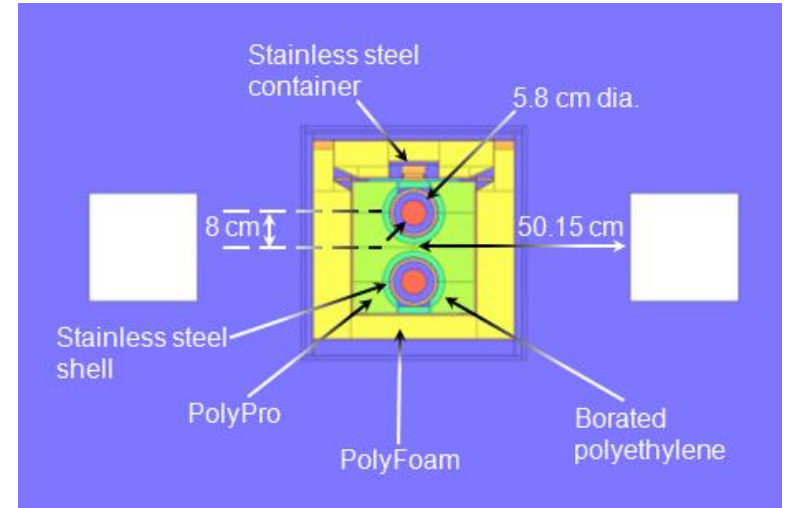
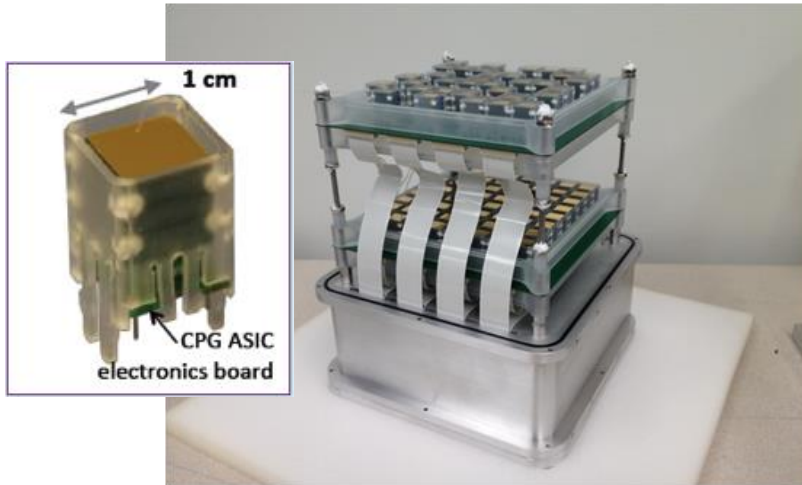
Gamma-ray Spectrum (simulated)

Thrust Area 3: Advanced Safeguards Tools for Accessible Facilities



Handheld/Portable Room Temperature Semiconductor Gamma-Ray Imagers

HEMI – High-Efficiency Multimode Imager



Multi-Modality
Quantitative Imaging
(NA-22 funded)

Thrust Area 3: Advanced Safeguards Tools for Accessible Facilities



Handheld/Portable Room Temperature Semiconductor Gamma-Ray Imaging

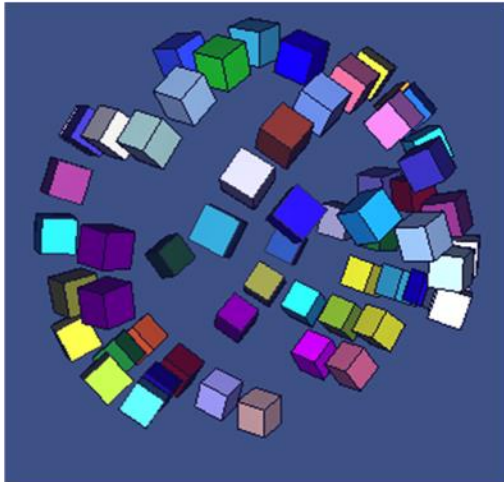
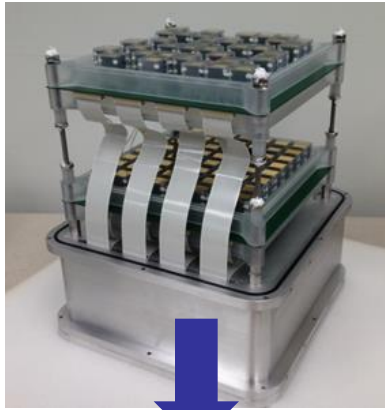
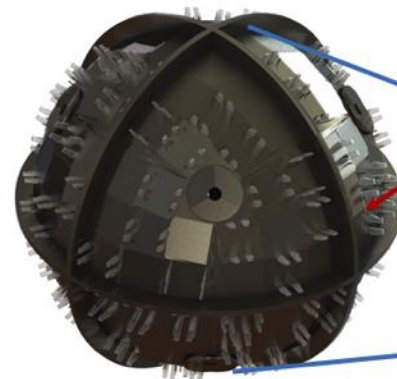


Image augmented with radiological threat

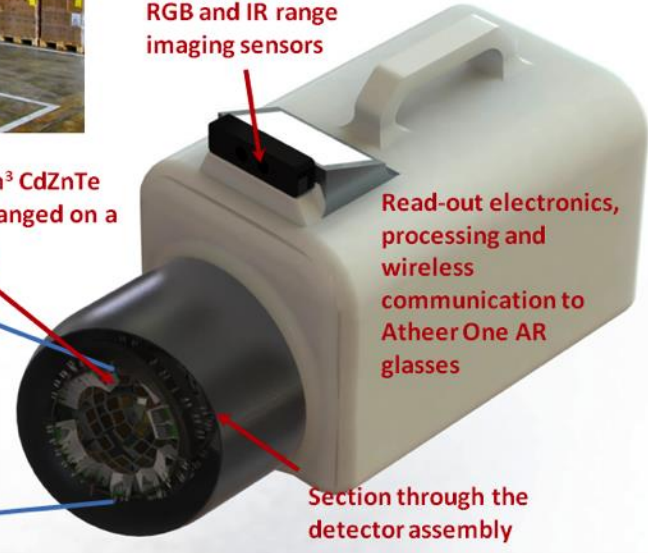
Wireless connection to Android-powered Ather One AR glasses



RGB and IR range imaging sensors



Coplanar 1cm³ CdZnTe detectors arranged on a quad-sphere



Read-out electronics, processing and wireless communication to Ather One AR glasses

Section through the detector assembly

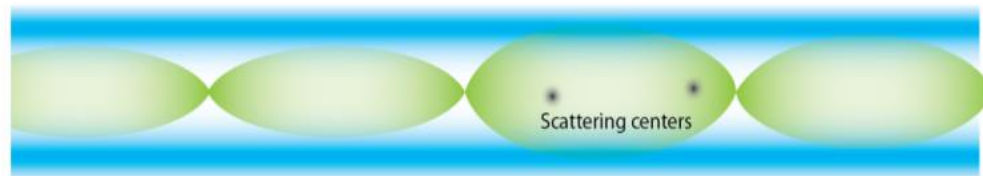
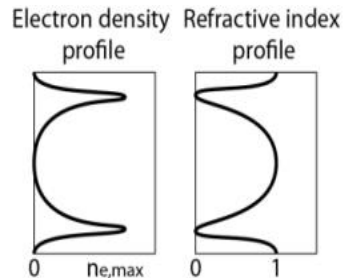
Portable Radiation Imaging, Spectroscopy, and Mapping (PRISM)

Thrust Area 3: Advanced Safeguards Tools for Accessible Facilities

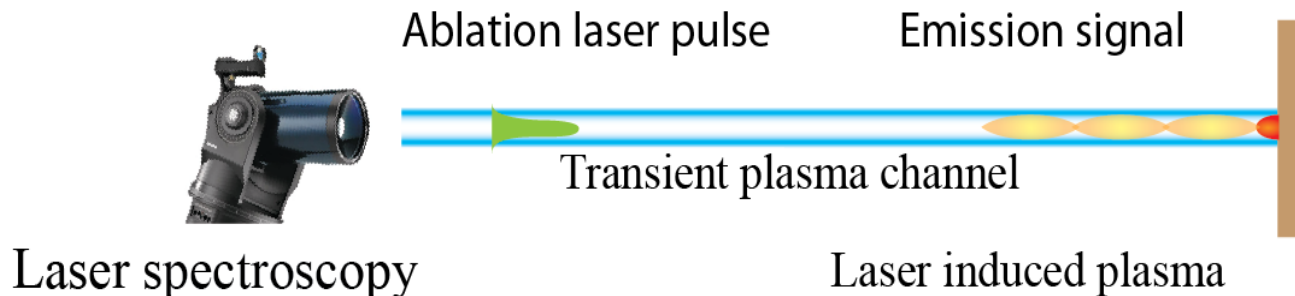


Stand-Off Measurements using LIBS for Limited Access Areas

Transient filament channel in free space



The laser plasma changes the refractive index n of the air!

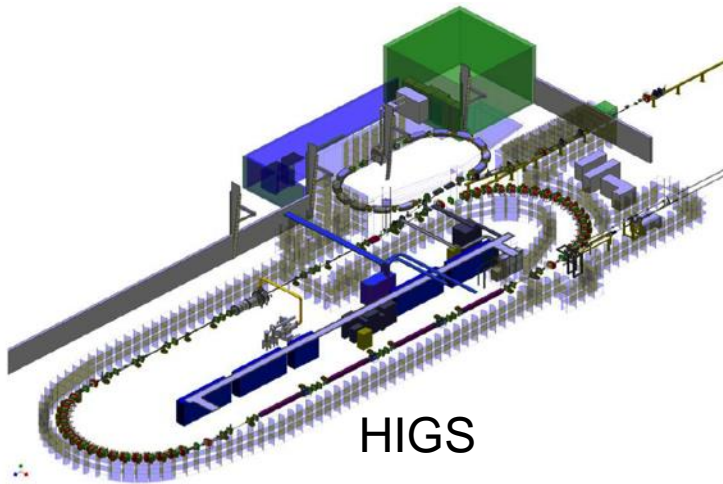


Establish ionized plasma channel as a “virtual” optical fiber using ring-shaped femtosecond pulse for long distance transport of moderate to low intensity nanosecond pulsed laser beam with subsequent light collection

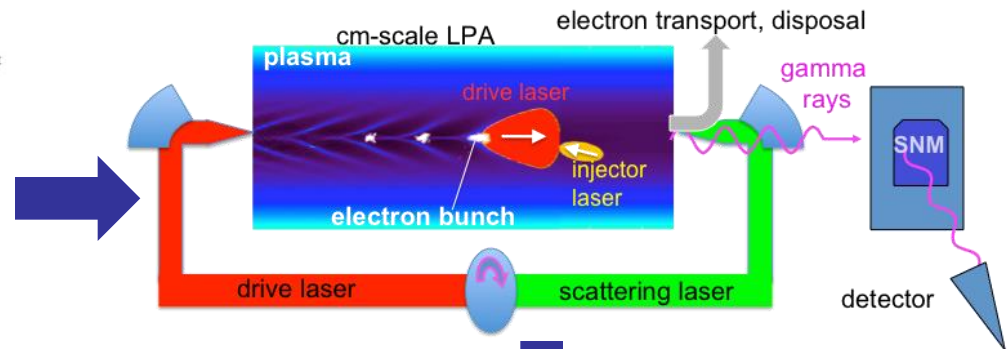
Thrust Area 5: Disarmament Verification



Limited Knowledge Transmission Nuclear Resonance Fluorescence



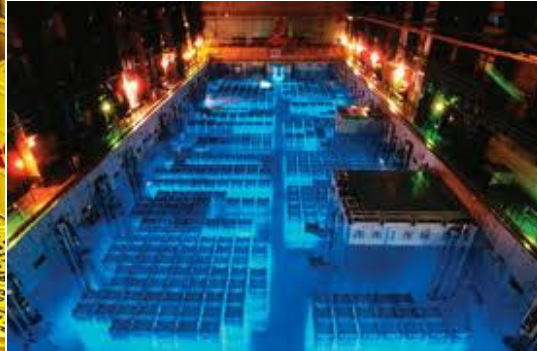
HIGS



Laser plasma accelerator driven inverse
Compton quasi-monoenergetic photon source

Thrust Area 5: Disarmament Verification

Limited Knowledge Transmission Nuclear Resonance Fluorescence



Assessing Impact of Monoenergetic Photon
Sources on Nonproliferation Applications
(radiography, photofission, NRF)

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Questions/Discussion

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