

Advancing neutron capture at LANSCE

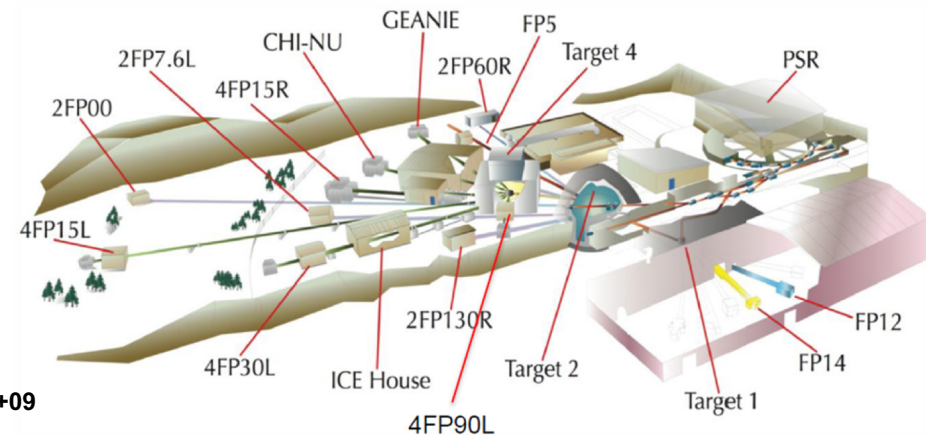
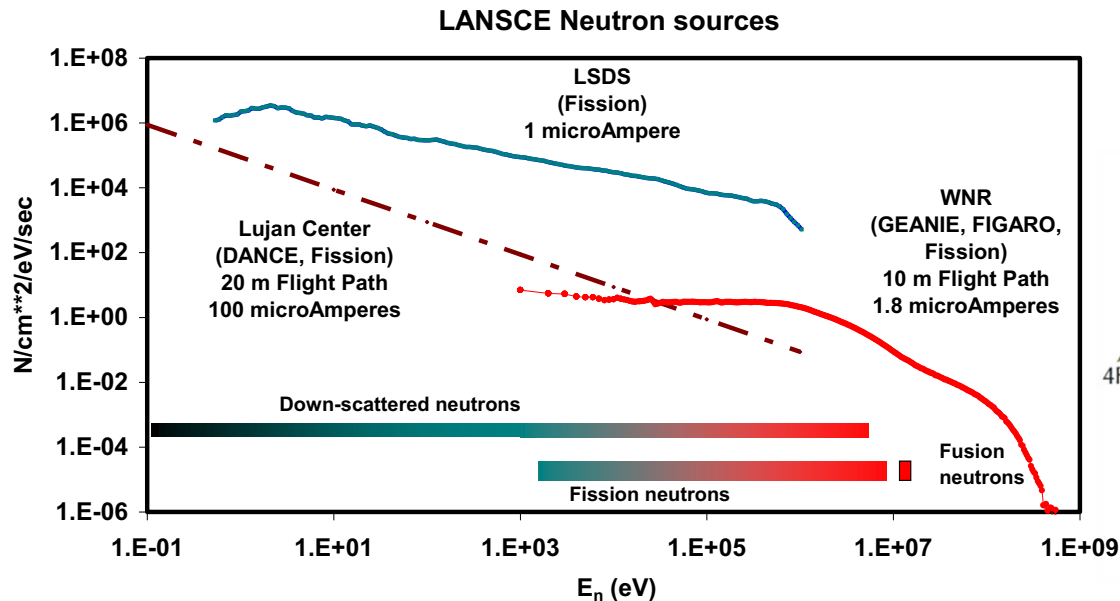


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LANSCE Weapons Physics

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LANSCCE offers measurements on a range of reactions and at many energies



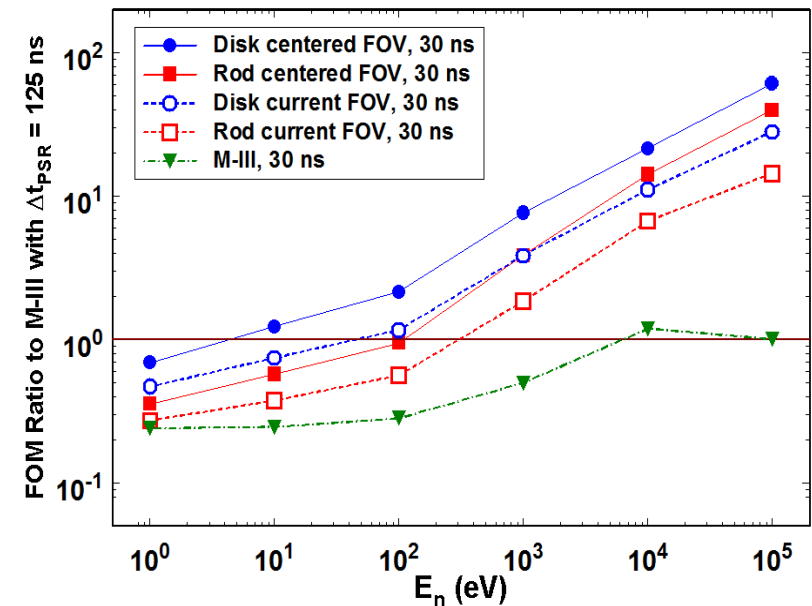
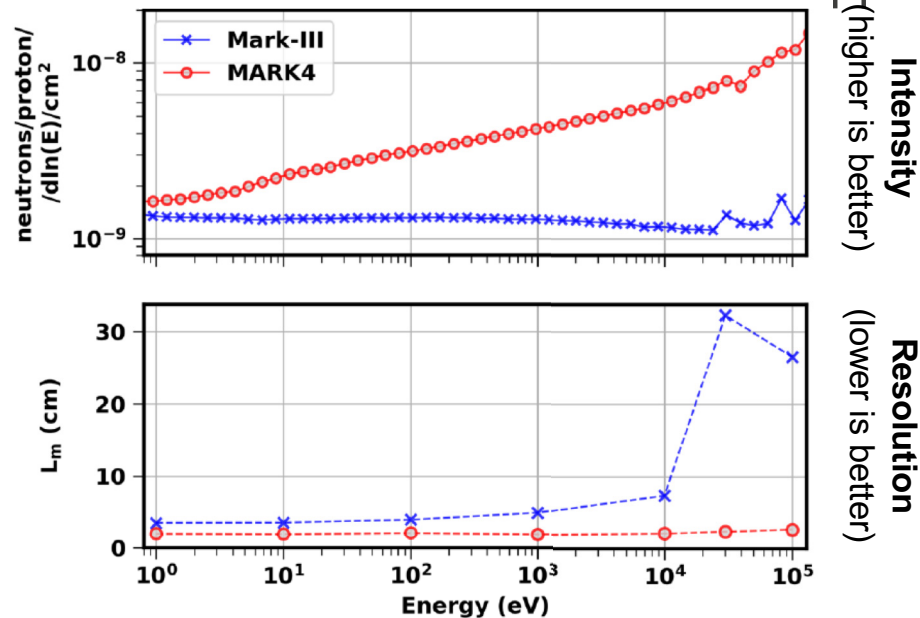
800 MeV linear accelerator: H^+ beams for isotope production and H^- beams to drive two neutron beam facilities

Lujan center: moderated spallation source, three flight paths devoted to nuclear science sub-thermal $\leq E_n \leq 500$ keV

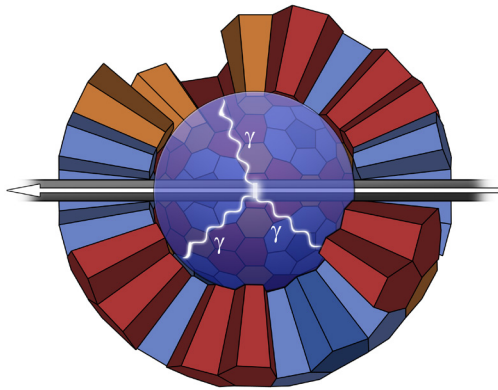
WNR: unmoderated spallation target, generating neutrons with 100 keV $\leq E_n \leq 600$ MeV

The Redesigned Lujan Target will Enhance Efficacy for Nuclear Science

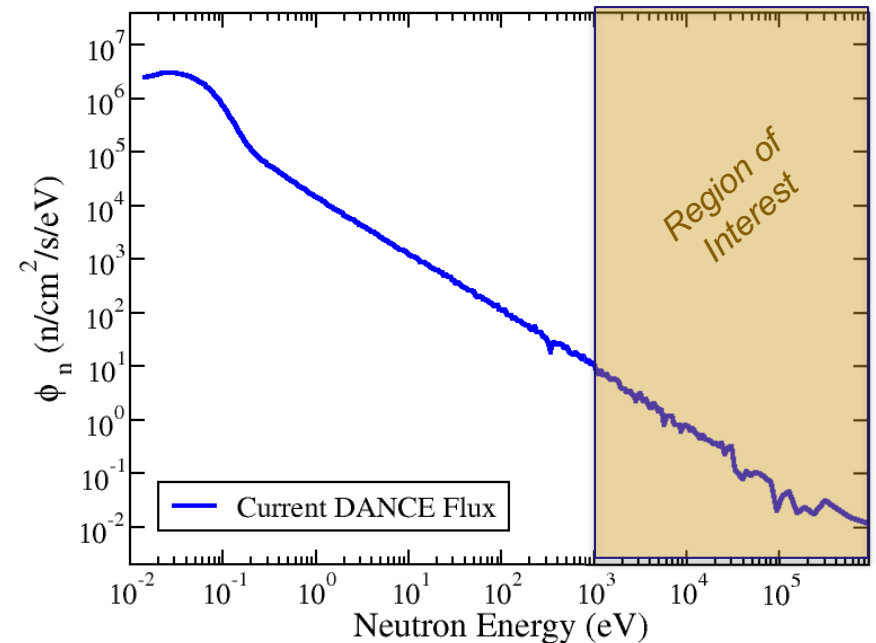
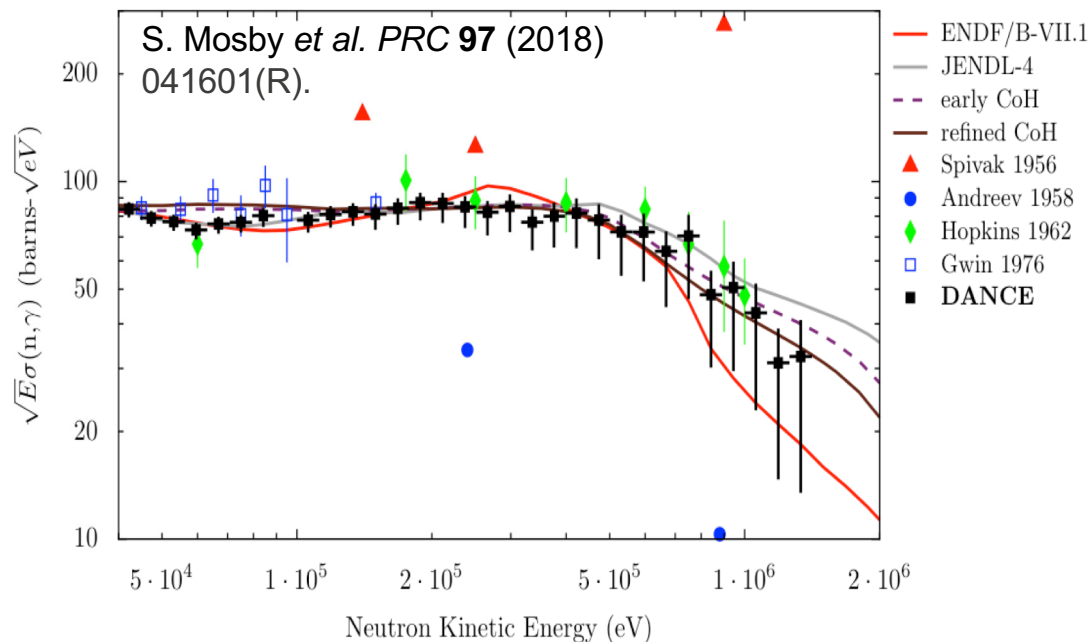
- Improved intensity and resolution in the keV-MeV neutron energy range expand the range of measurements
 - Radiochemical detectors
 - Nuclear forensics
 - Weapon outputs and effects
 - Neutron elastic scattering for applications, including NDSE



Target enhancements expand reach and fidelity for neutron capture measurements

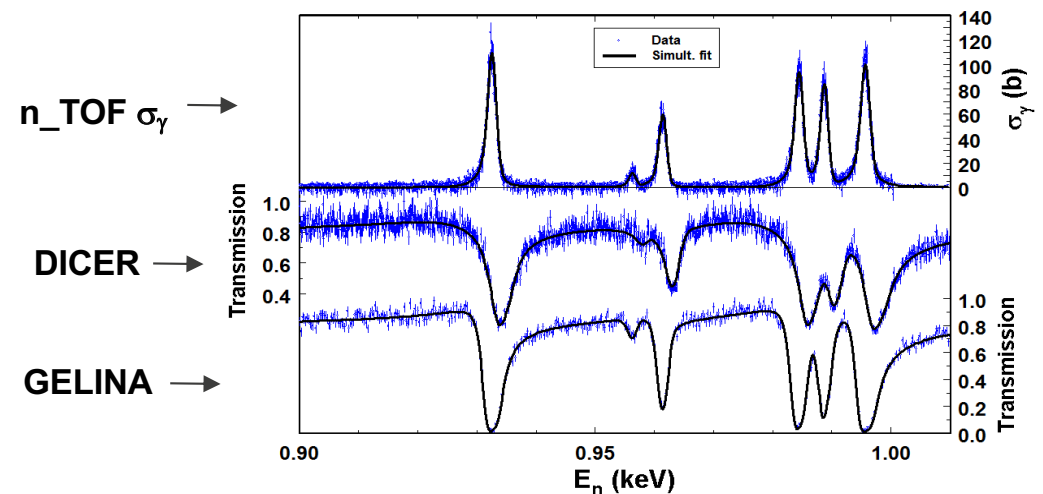
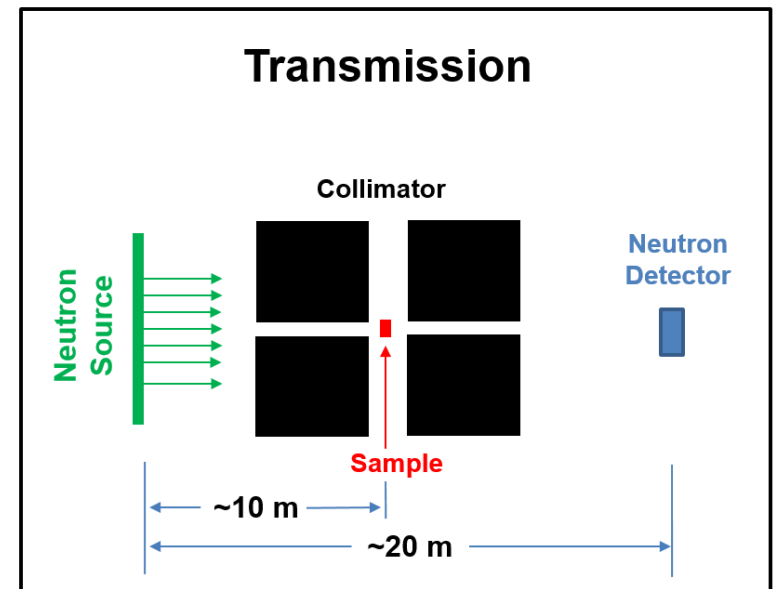


- The keV—MeV energy range is the most critical for radiochemistry and forensics
- This is exactly the region of enhancement from the new target design
- There are a wide range of isotopes that will be accessible for new or improved measurements



DICER to benefit from LANSCE Isotope Production and Improved Lujan Target

- DICER is a nuclear science instrument under development at the Lujan Center for investigation of short-lived nuclei
- The goal is to measure resonance scattering directly and couple this to nuclear theory to predict neutron capture
- Total cross sections at Lujan require time-of-flight resolution
- The improved Lujan target will enable measurement on previously unreachable radiochemical detectors (^{88}Y) and structural materials for Forensics



Takeaways

- New LANSCE capability for high-intensity, high-resolution measurements in the keV-MeV regime
 - New target to be installed in spring 2020
- Existing instruments will be able to take advantage of the capability to address questions in radiochemistry, performance, nuclear energy, and nuclear astrophysics on day 1
- Full exploitation of the new capability will require optimization and additional investment in instruments