

# Successful PFUNS Execution

## Real-time Update

Joetta Goda, Jesson Hutchinson, Theresa Cutler, Rene Sanchez, Travis Grove, Alex McSpaden, Jessie Walker, Rob Weldon, Nick Whitman, Kenny Valdez, Trevor Omoto, Matthew Gooden

LA-UR-24-22173

# Prompt Fission Neutron Uranium Spectrum (IER 153)

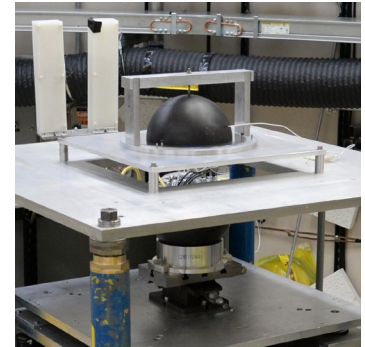


Unique approach to determining PFNS to reduce uncertainties in  $^{235}\text{U}$  PFNS, especially above 5 MeV, using threshold neutron detectors/activation foils.

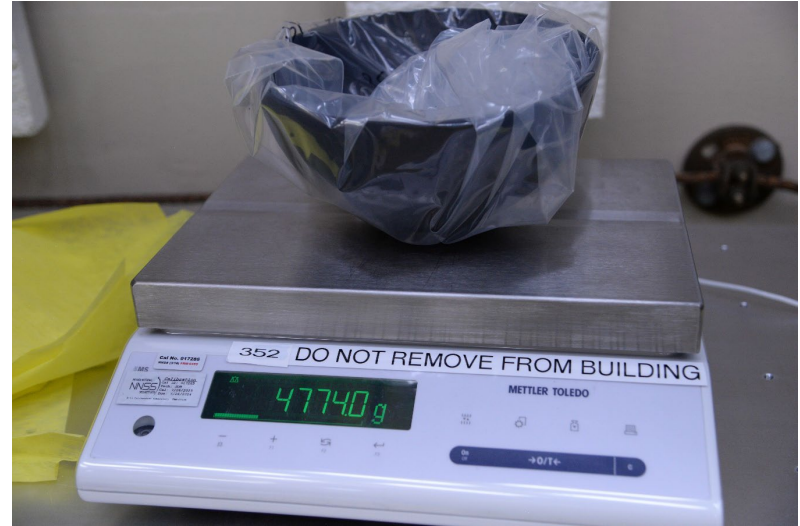
## MIHL Item

- Published analysis of preliminary activation run
- Preparations for high power runs **CED-3a milestone**
  - Relocated components to lower dose areas
  - Analyzed calibration runs in FY22
  - Prepared irradiation and counting plans
  - Continued upgrades to Count Room
    - New Aegis detector, calibration sources,...

*Complementary to chi-nu experiment performed at LANSCE recently and subsequent nuclear data evaluation*



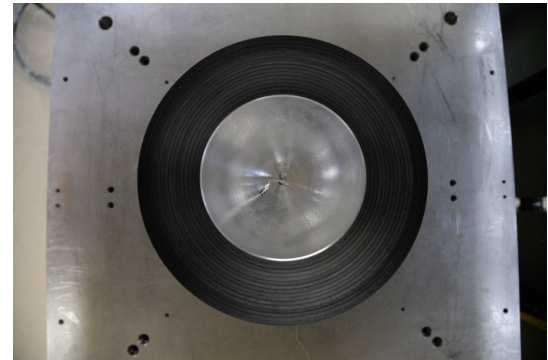
# Week 1: Rocky Flats Shells



Uses Rocky Flats Shells—  
similar to MUSIC, but with opening for foil irradiation  
Rocky Flats Shells decontaminated and weighed



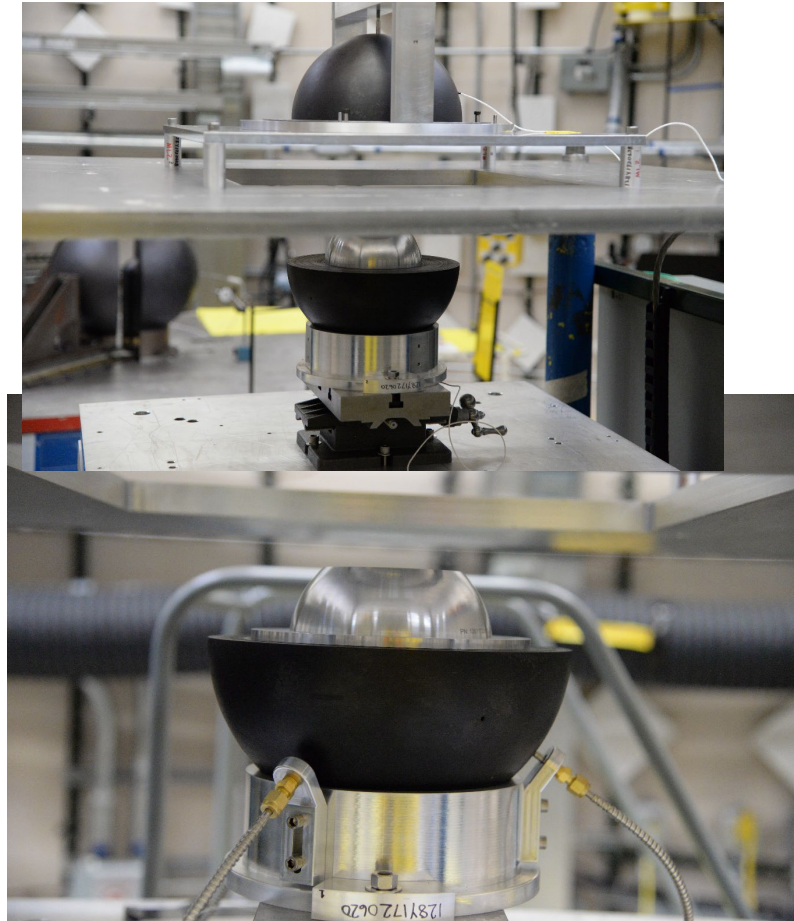
# Week 1: Fuel loading



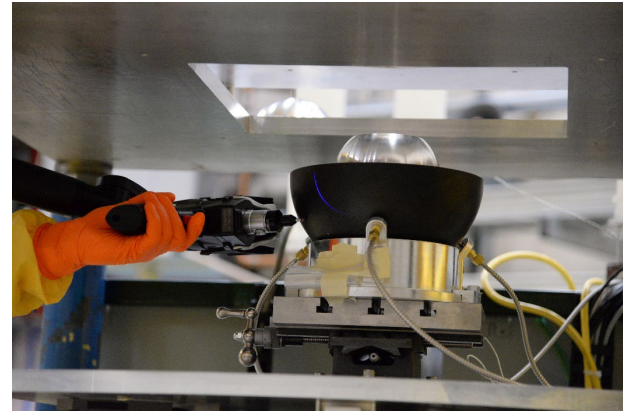
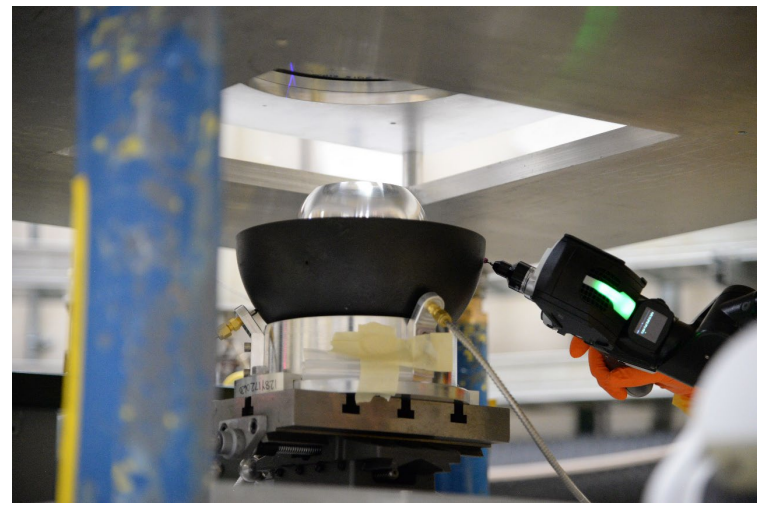
# Week 1: Fully Loaded



Assembly



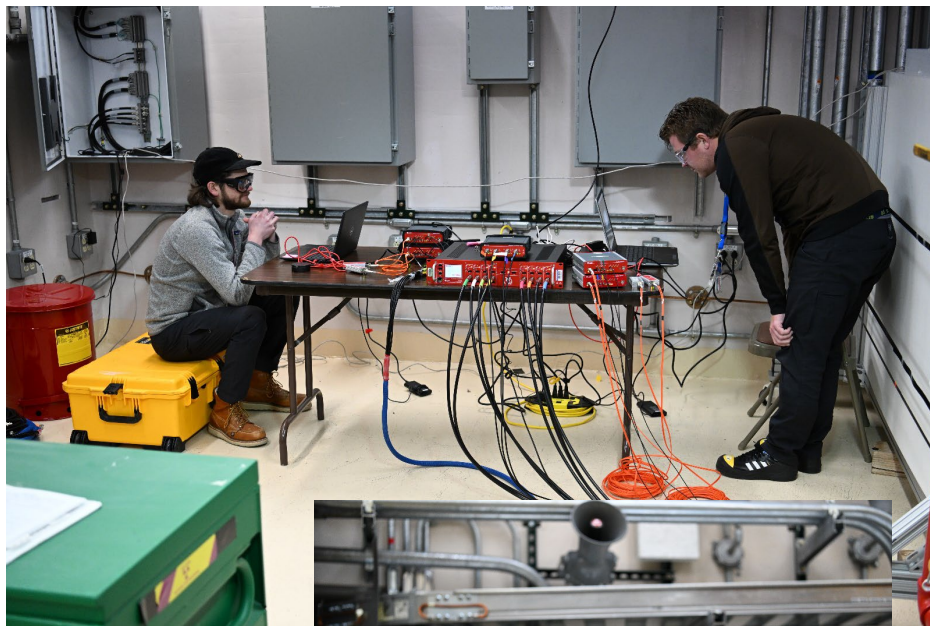
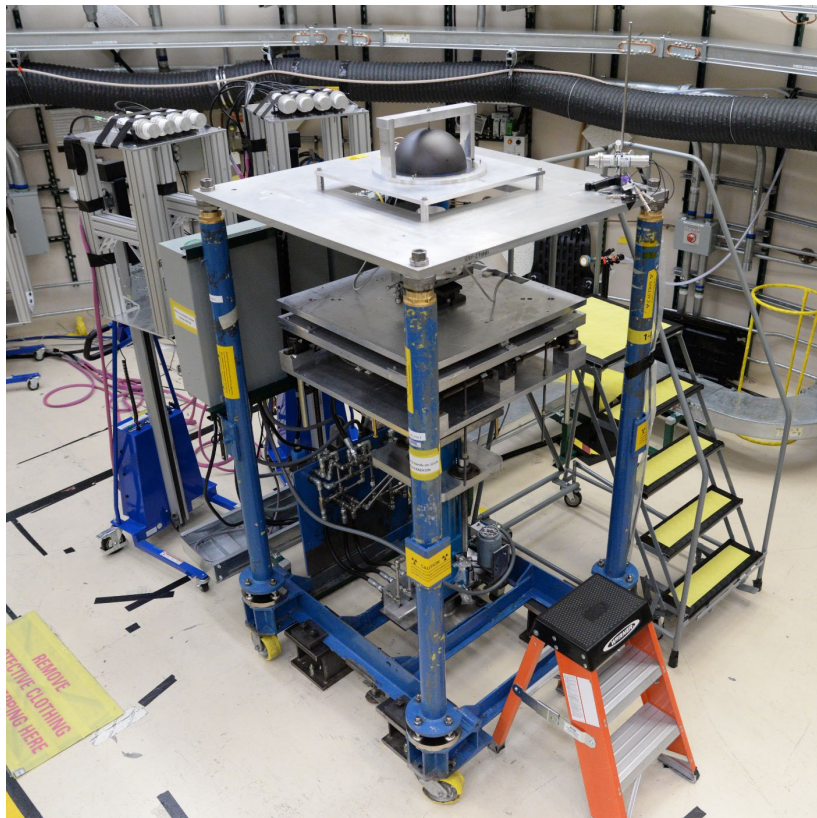
# Week 1: CMM Measurements



CMM measurements



# Week 1: Organic Scintillators



# Week 1: Spacer Rings used to adjust reactivity





# Week 2: Critical Configurations

Benchmark configurations

no source, RTD's, sample plate, etc.

Configurations with sufficient reactivity for each irradiation accounting for specific sample tray.



# Week 2: Camera Displays



# Week 2: Dosimetry Placement



Shield over Planet Control Components

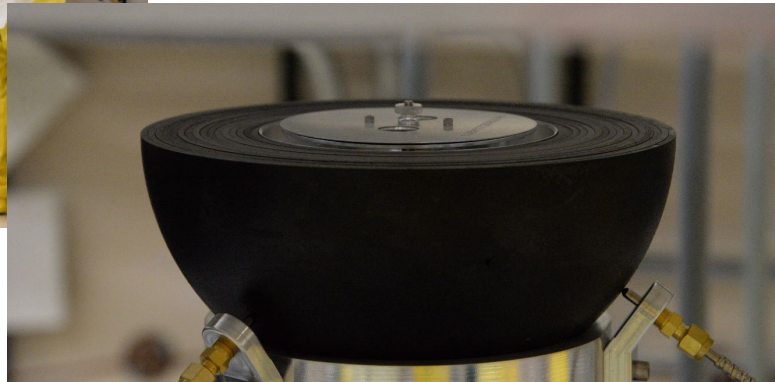
TLD's in light-tight plastic bags



# Week 3: Sample Placement



Sample plate without samples or cover



# Week 3: Tuesday Irradiation

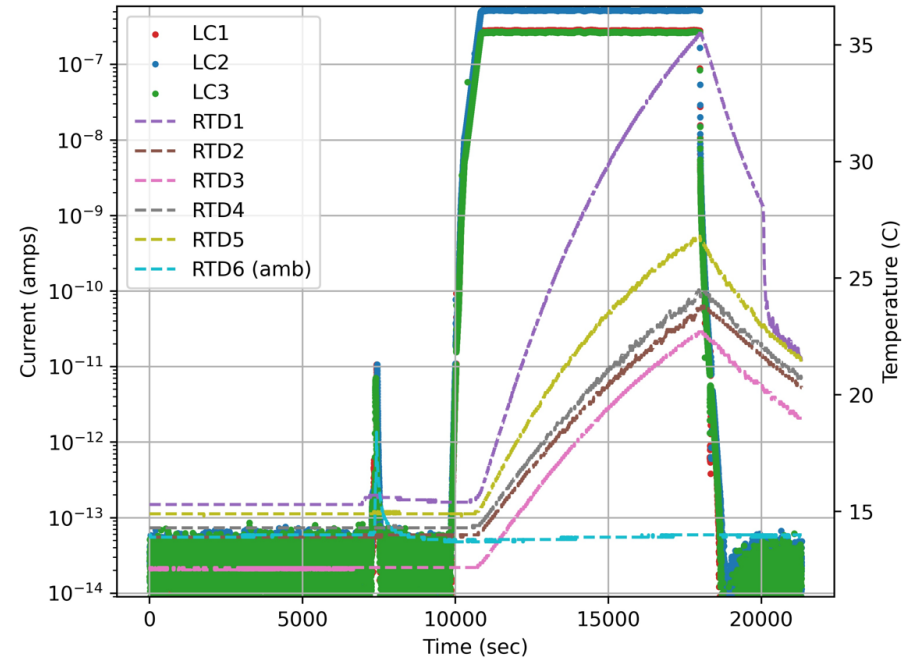
Duration: 2 hours

Dose Rate: 35 R/hr

Temperature rise:

- 20 °C in the center,
- 10 °C on the bottom outside
- 12 °C on the top outside

Current: 3.80e-3 amp-sec on LC2



Re-entry: 20-30 minutes after auto run out.

Retrieval; 37 min after auto run out.

Dose rate: 3 R/hr.

Worker dose during retrieval: 25 mrem.



# Week 3: Wednesday Long Irradiation

Duration: **12 full hours!**

- Full power start time: 08:52
- End of irradiation time: 20:52

Dose Rate: 70-75 R/hr.

- The RMS3 failed early on in the irradiation and is out of service.

Temperature rise:

- 63 °C in the center
- 34 °C on the bottom outside
- 36 °C on the top outside

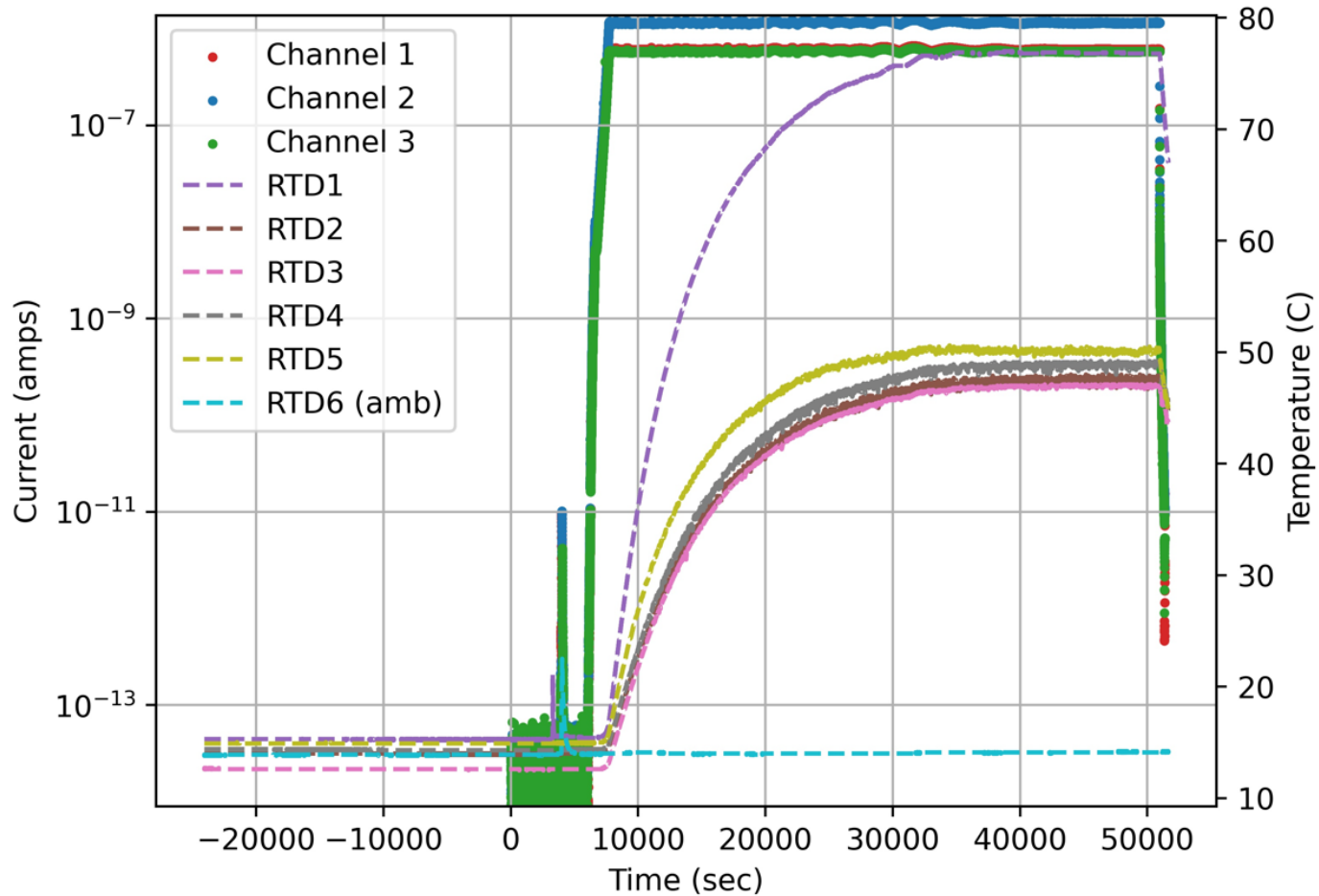
Current: 5.02e-02 amp-sec on LC2



Camera Degradation

Largest irradiation performed in Planet history (including at TA-18)

# 12 hour Irradiation



# Week 3: Retrieval and sample loading





# Now the next phase begins -- sample counting

