Successful PFUNS Execution
Real-time Update

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LA-UR-24-22173
Prompt Fission Neutron Uranium Spectrum (IER 153)

Unique approach to determining PFNS to reduce uncertainties in $^{235}$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

TLD’s in light-tight plastic bags

Shield over Planet Control Components
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

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

- Channel 1
- Channel 2
- Channel 3
- RTD1
- RTD2
- RTD3
- RTD4
- RTD5
- RTD6 (amb)
Week 3: Retrieval and sample loading
Now the next phase begins -- sample counting