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IRSN
INSTITUT DE RADIOPROTECTION ET DE SÛRETÉ NUCLÉAIRE

IRSN WORK IN SUPPORT TO NCSP: FY2022

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MEMBRE DE ETSON

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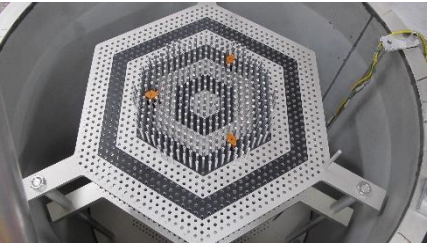
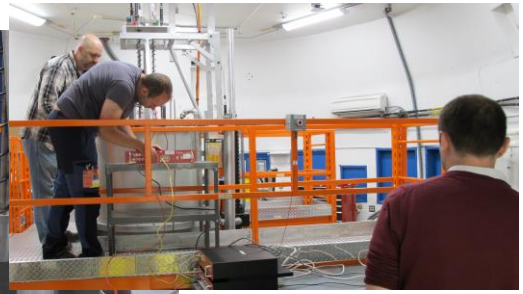
Highlights on FY2022 work

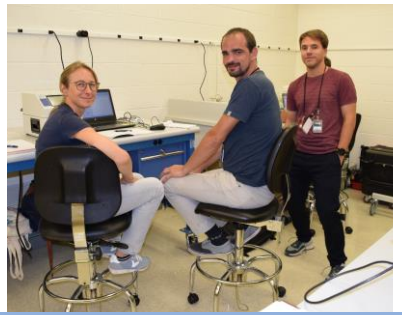


FY 2022 : an exceptional year for IRSN, participation to 3 IEs

- IER 518 : High multiplication subcritical benchmark at Sandia SPRF/CX
  - SNL, LANL, LLNL, IRSN
  - June 6th-10th
  - first use of IRSN He^3 detectors



- IER 538 : Godiva dosimetry exercice at NCERC NAD Lab
  - 10 staffs from US DOE NL, Navy, AWE and IRSN
  - August, 22nd-25th



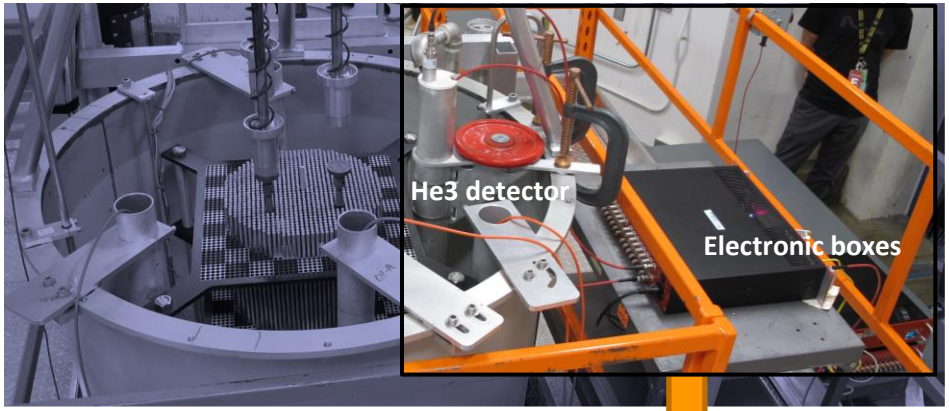
- IER 305 : Mo experiment at Sandia SPRF/CX
  - SNL, IRSN
  - IRSN Participation from September 12th to 16th

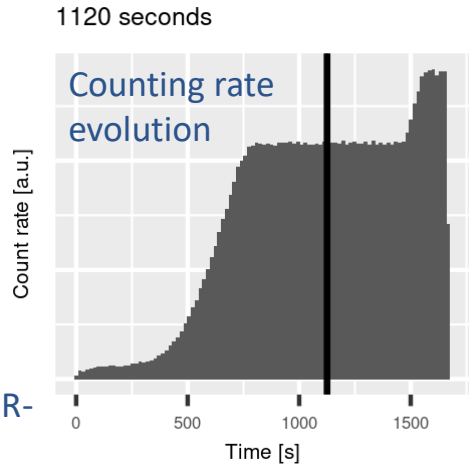
Benchmark IER-518 @ SNL with LLNL & LANL

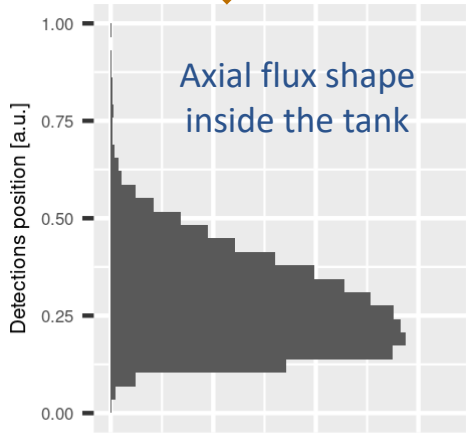
- Very good welcome and very good technical exchanges. The team was always available to help us.
- First time IRSN use its own neutron noise detector for a real experiment.
- Time and space correlation capabilities. (New capabilities)
- The detector works properly for low count rate, but it saturates from a very low threshold of flux
  - Firmware has been updated to fix the problem
  - IRSN just bought stronger neutron sources to better test its detector

✓ Many lessons learned on how to use our detectors in experiments

✓ Interest in participating in the analysis of the results of IER-518 and future experiments



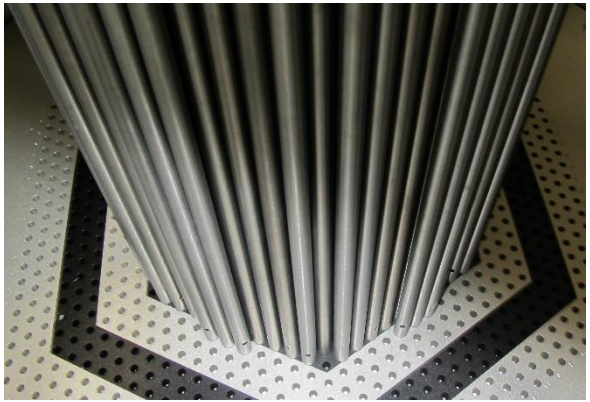


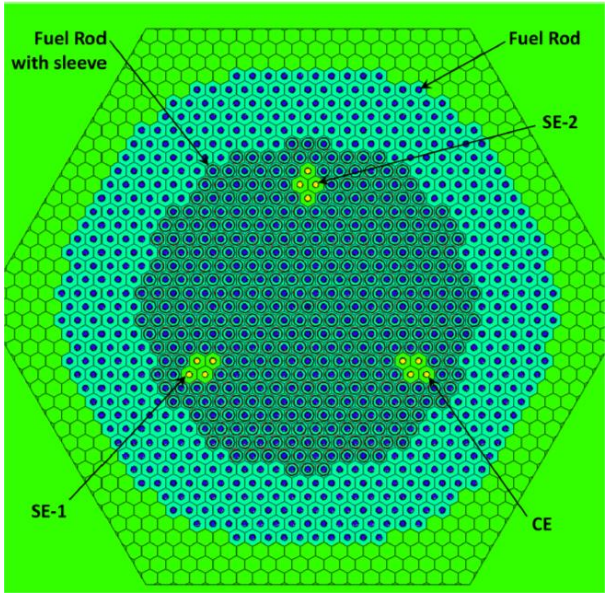


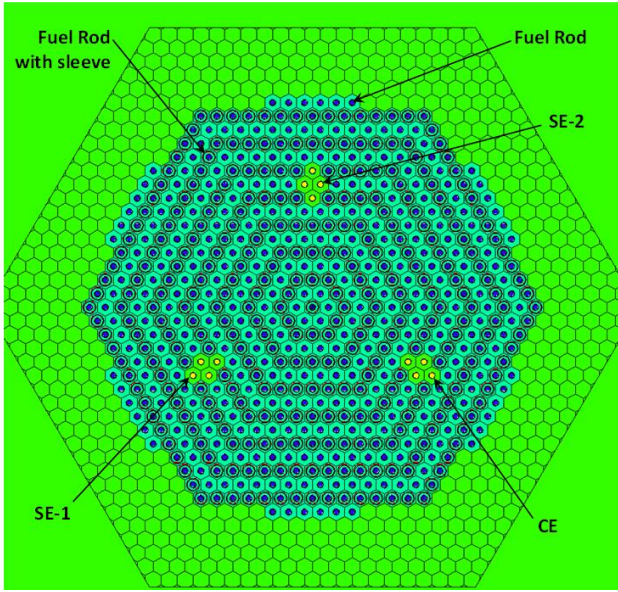
IER305 - Mo experiments

[DESIGN LEADED BY IRSN TO GO FURTHER AFTER THE FRENCH MO MIRTE EXPERIMENT

- **Sandia SPRF/CX** facility
  - use of the 7uPCX assembly with the 1.55 cm triangular pitch grid plates
  - Additional use of Molybdenum sleeves (397 at maximum) with a nominal thickness 0.031” (0.078 cm)

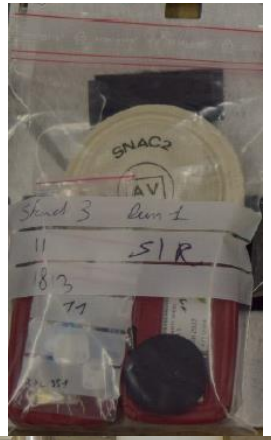


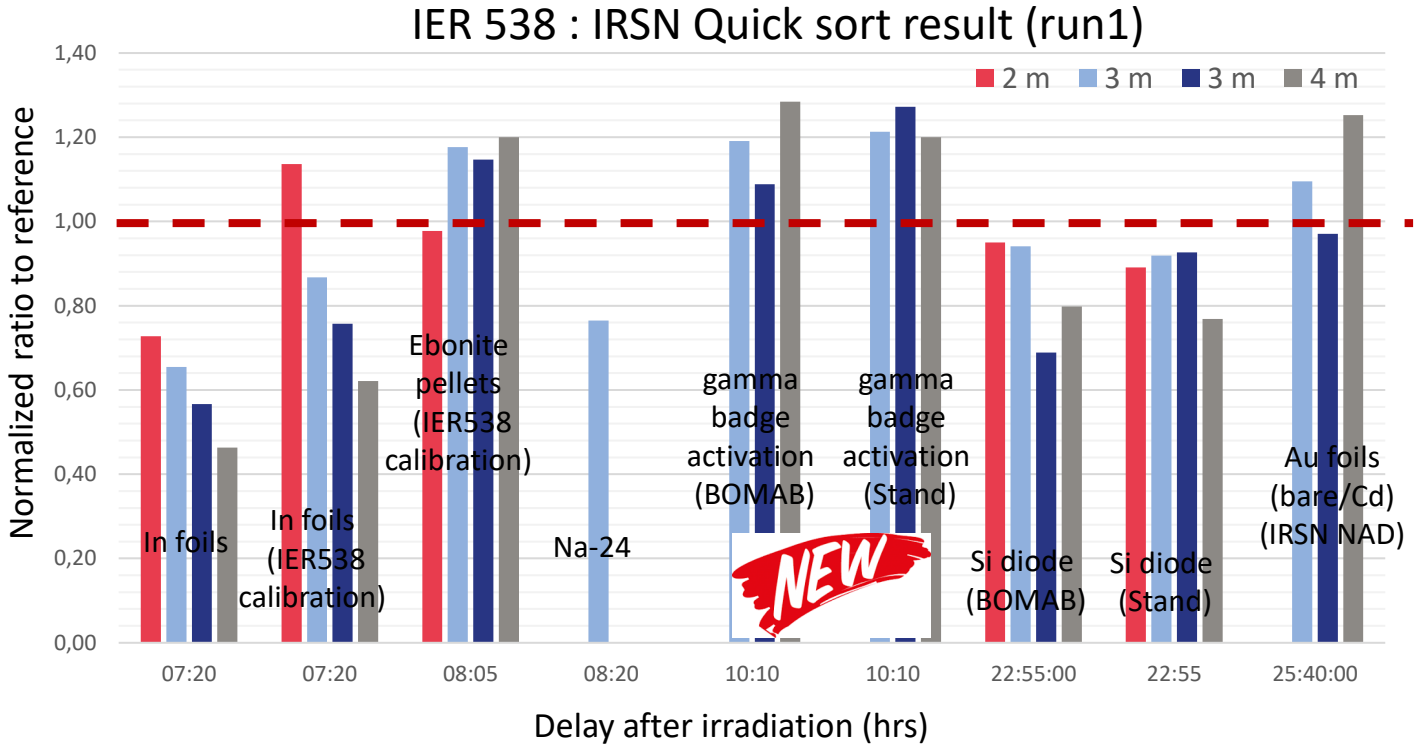




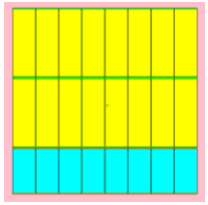
- Two loading patterns for the approach-to-critical experiment:
  - With a central zone of sleeved rods surrounded by unsleeved ones
  - with alternating rings of sleeved and unsleeved rods

Dosimetry exercice : an opportunity to practise and test new technics





IE design



PUMN fuel plates

- IER296 TEX-MOX :
  - Official release of CED1
  - Thermal and mechanical design study to cope with fuel heating and assembly weight issues
    - » See Jeremy BEZ's talk
- IER488 MUSIC:
  - Modeling with MORET code
  - Benchmark external review started
- IER517 Molybdenum experiments on PLANET machine
  - CED1 review
- IER547 TEX Low temp
  - Contribution to the design to optimize sensitivities on structural materials

Analytical Methods & Nuclear Data

- Slide rules :
  - Analysis of differences of delayed gamma doses computed by the ORNL, LLNL and IRSN Discrepancies due to nuclear data libraries.
  - Publication at NCSD 2022

- K-eff intercomparison exercise, phase 2 => Aurélie Bardelay's talk
  - Publication at ND2022

- Nuclear data evaluation
  - Paper on validation of O^{16} at ND2022
  - Paper with RPI/NNL on the URR for Rh103 completed and submitted to ANE
  - Work on U233, Mo95, Pu239, Fe54, Fe56, Gd155, Gd157, F19…

FY 2023 challenges

Main FY2023 challenges

IER 296 CED2 : Complete of detailed design of TEX-MOX
- Milestone of the NCSP FY 2022 “Make it happened” list

IER 484 : Dosimetry on AFFRI reactor
- Visit and characterization (13-17 February)

IRSN-AM5/ORNL-AM6/LLNL-AM3 : Update of the slide rules
- Completion of the action in 2023

IRSN-AM13/ORNL-AM10/LLNL-AM5/LANL-AM5 : Benchmark intercomparison study
- Completion of the action, final report

CONCLUSION

- **After COVID, 2022 was an exceptional year for IRSN - NCSP collaboration, with 3 experiments**
  - MANY THANKS to US colleagues for their help, availability and motivation to complete these milestones !!!
  - After the shut down of French criticality facility in 2013, it is very important for us.

- We are working today to finalize the design of IER 296 TEX MOX experiment (MIHL FY2023)

- **Many interesting project are ongoing : TEX Low Temperatures, AFRRI characterization for future dosimetry exercises.**

- We are also on track to finalize in 2023:
  - Codes intercomparison
  - Slide rules.

Thank you !