

VALIDATION OF LEAL AND HALE O-16 EVALUATIONS AGAINST FNS/JAEA LIQUID OXYGEN TOF BENCHMARK

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Benchmark and analysis

The benchmark was performed at the 14 MeV D-T neutron facility at FNS/JAERI. Measurement of angular neutron leaking spectra from a 20 cm slab of liquid oxygen in the 0.05 - 15 MeV energy range. Angular fluxes at 0, 12.2, 24.9, 41.8 and 66.8 degrees were measured.

Complete description is included in **SINBAD** and available from OECD/NEA Data Bank and RSICC (see <https://www.oecd-nea.org/science/wprs/shielding/sinbad/>). Benchmark was re-analysed and SINBAD compilation updated in 2010 including complete new revision of time vs. energy domain computational models.

Drawback: Uncertainty in neutron effective flight path parameter, information needed on detector efficiency function, details on conversion of experimental TOA to E spectra.

Analysis: was performed using the MCNP-6 Monte Carlo in energy and time domain for the Oxygen cross sections from ENDF/B-VII.1, and new evaluations from **Luiz Leal (files ORNL1 and ORNL2 provided by L. Leal)** and **Gerry Hale (file "O16_halead" from IAEA <https://www-nds.iaea.org/CIELO/>)**. Results of calculations performed in **time domain** and converted to energy are presented here.

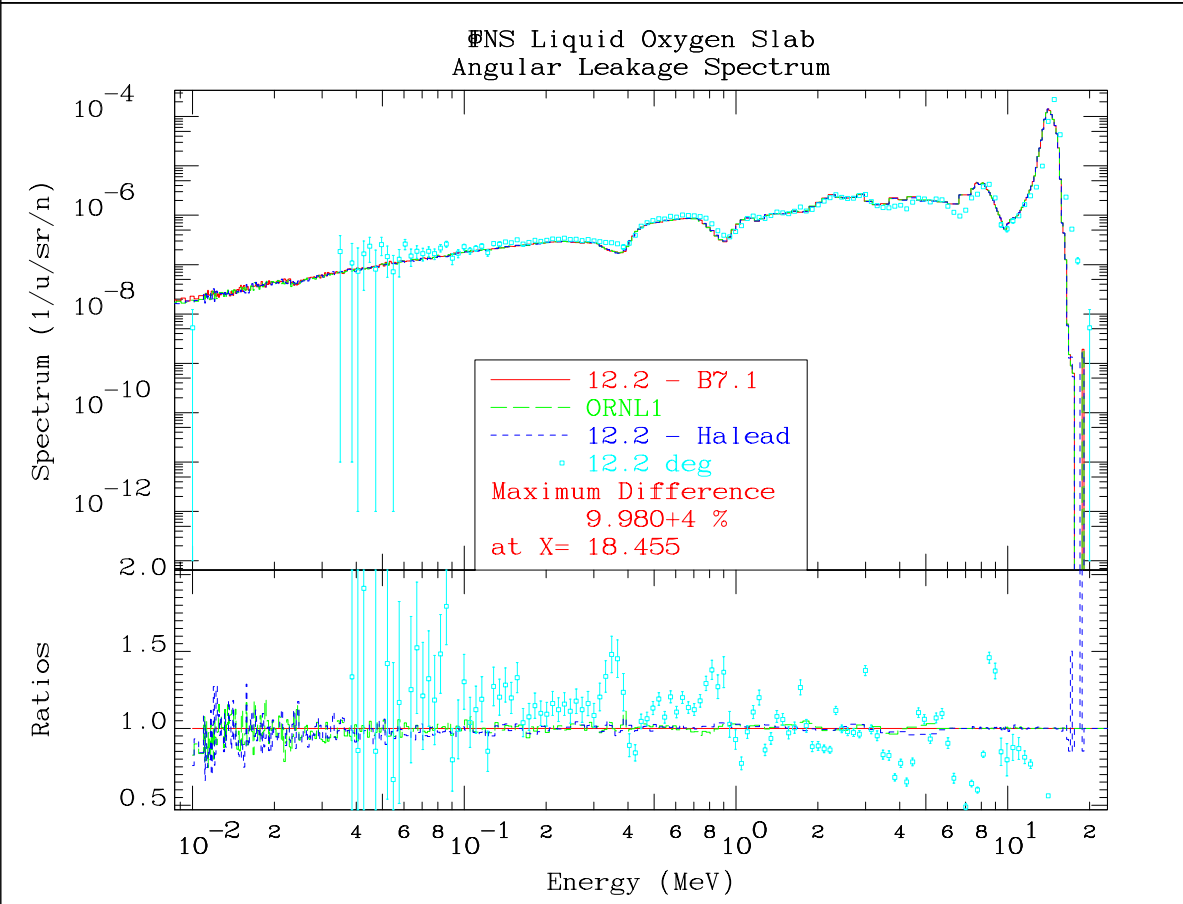
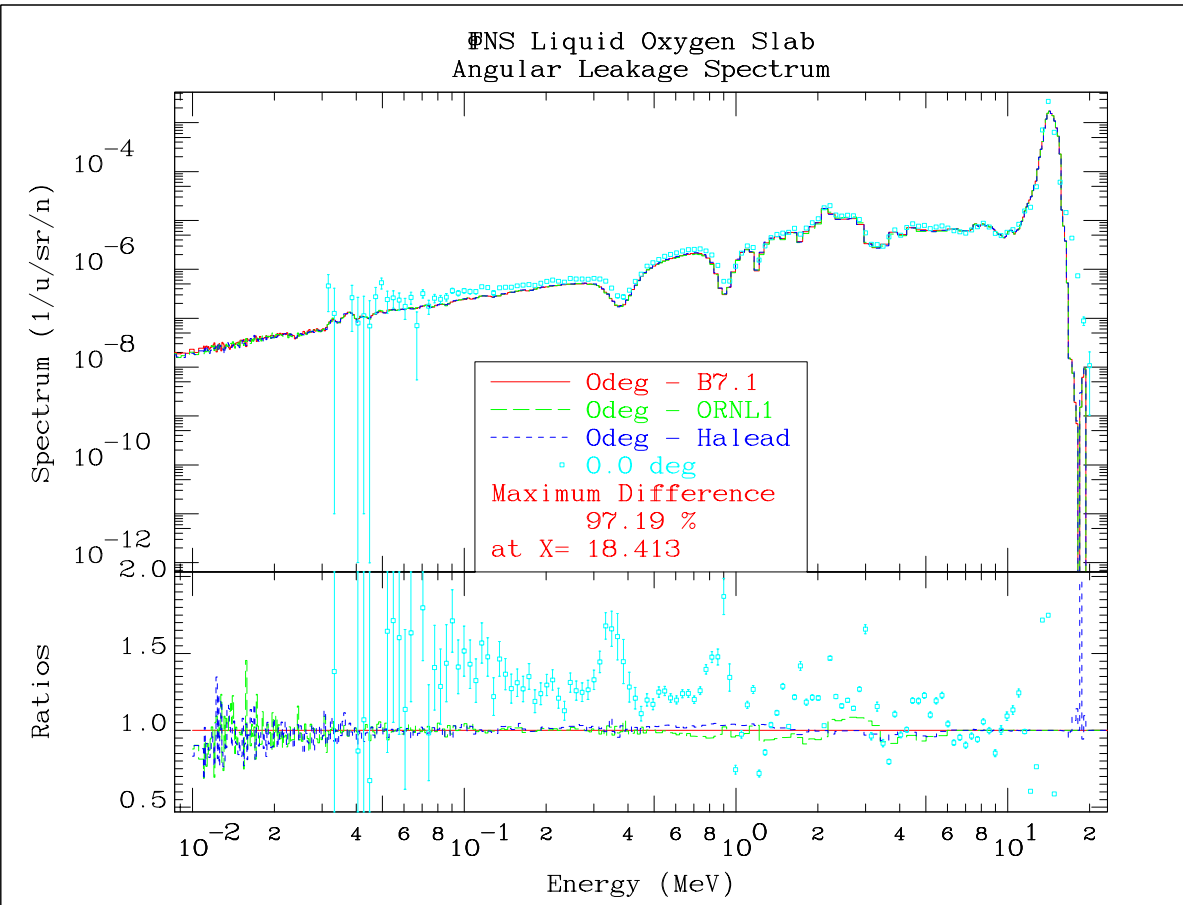
In the past the benchmark was analysed using DORT with first collision source (GRTUNCL). This approach is suitable for cross-section sensitivity-uncertainty analysis and could be repeated if needed.

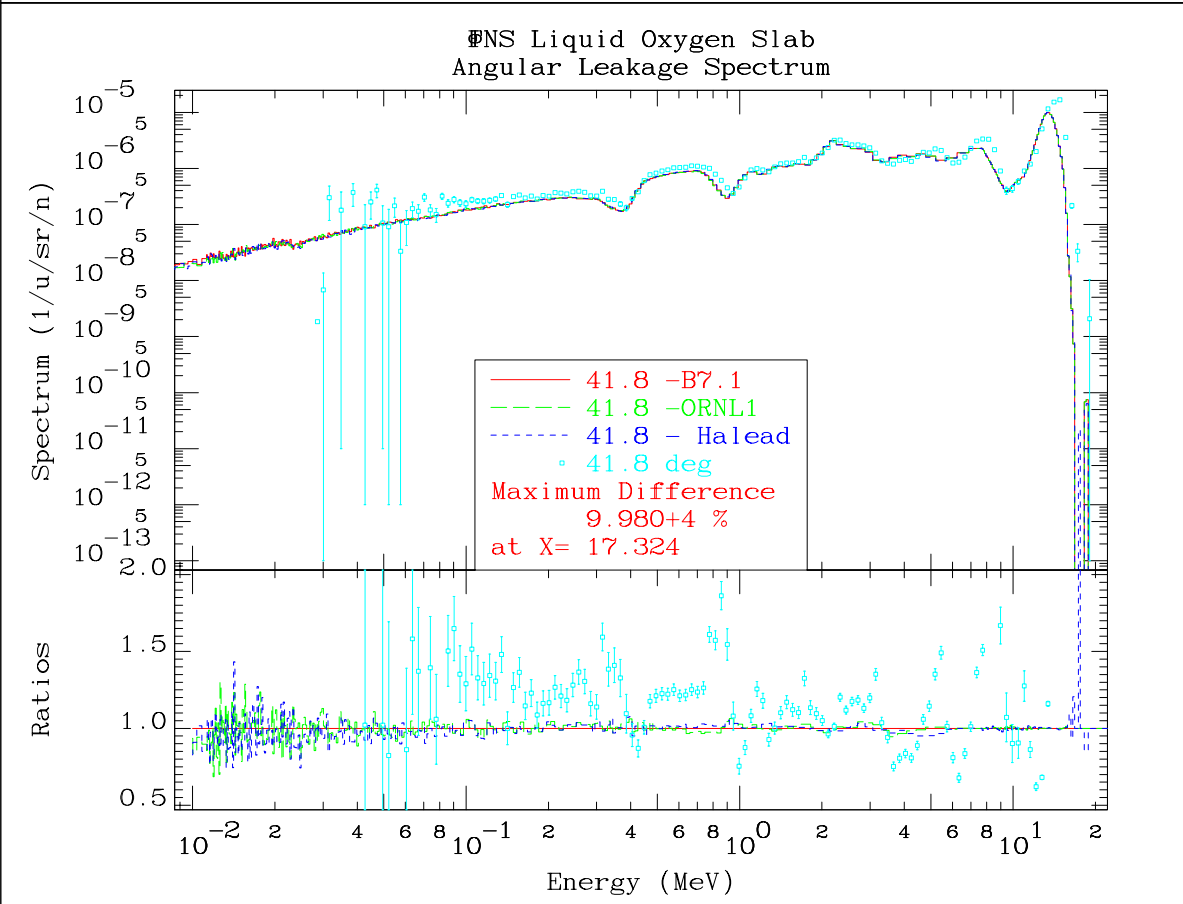
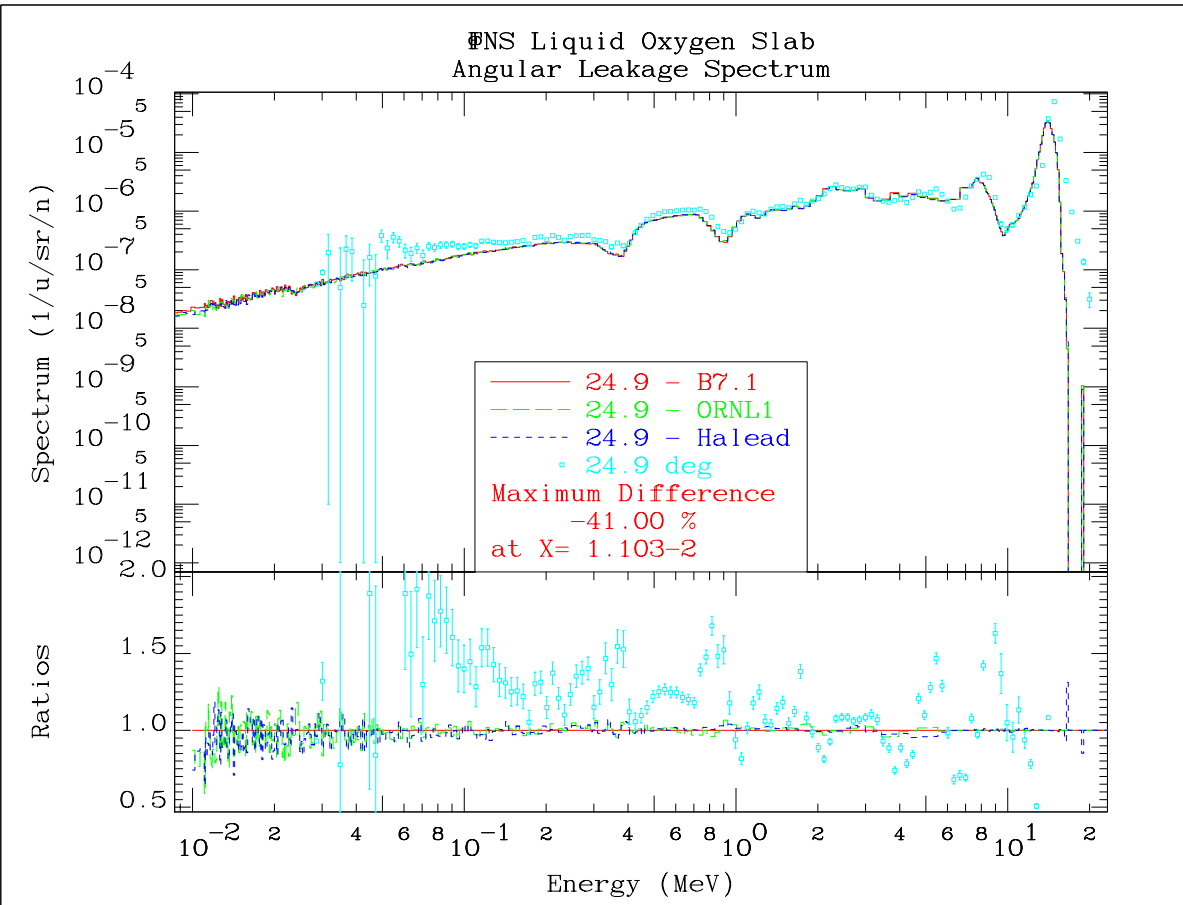
Conclusions

- Relatively good agreement between the measured and calculated spectra for Leal, Hale and ENDF/B-VII.1 evaluations, with no significant trends with increasing angle.
- Little difference between spectra calculated using MCNP6 with ENDF/B-VII.1, Luiz and Have files, suggesting that the benchmark is possibly not selective enough.

References

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- I. Kodeli: Verification of Oxygen Cross Section Data for Oil Well Logging Applications, Int. Conf. on Nuclear Data for Science and Technology, ND2001, Tsukuba, Japan (7-12 Oct. 2001).
- A. Milocco, I. Kodeli, A. Trkov, The 2010 Compilation of SINBAD: Quality Assessment of the Fusion Shielding Benchmarks, NEMEA-6 Proceedings, OECD/NEA 2010





ΦNS Liquid Oxygen Slab
Angular Leakage Spectrum

