



REAL-WORLD VALIDATION

Astral Systems provides access to both D–D (2.45 MeV) and D–T (14.1 MeV) neutron sources, enabling organisations to validate simulations, reduce uncertainty, and generate real-world performance data.

Our neutron irradiation services support the development, qualification, and optimisation of technologies across fusion, fission, aerospace, defence, electronics, security, and advanced materials.

Move beyond theoretical predictions and gain empirical insight into material behaviour, component degradation, and system performance under neutron exposure.

APPLICATIONS

Radiation Hardness Testing

Evaluate the effects of neutron radiation on electronics and critical components, including:

- Single Event Effects (SEEs/ SEUs)
- Displacement damage
- Total Ionising Dose (TID)

Generate the data needed to improve reliability, optimise shielding strategies, and qualify systems for demanding environments.

Neutron Activation Analysis (NAA)

Perform highly sensitive, non-destructive elemental and trace impurity analysis for:

- Research and development
- Quality assurance
- Industrial processes
- Forensic investigations
- Geological studies

Neutron Damage & Durability Testing

Assess how prolonged neutron exposure affects material performance, including:

- Embrittlement
- Swelling
- Displacement damage
- Mechanical property changes
- Electrical performance degradation

Material Qualification & Regulatory Validation

Replicate operational neutron environments to support material qualification, certification, licensing, and regulatory approval.

Neutron Radiography

Neutrons can penetrate materials that are challenging to inspect using X-rays, enabling the imaging of complex or high-density components such as turbine blades and engineered assemblies.

WHY ASTRAL SYSTEMS?

Competitive Volumetric Neutron Flux & Fluence

- Accelerate testing programmes and generate meaningful results within practical timescales.
- Readily available 1×10^{11} n/cm² total fluence per irradiation campaign
- Tuneable neutron fluence and energy profile dependent on customer needs
- Optional additional dosimetry for neutron fluence and energy quantification
- Higher fluences coming soon and open for pre-booking

Volumetric Neutron Source

Unlike point-source systems, Astral's volumetric neutron source better replicates real-world irradiation environments and accommodates larger samples and devices.

- Highly flexible and adaptable neutron irradiation platform
- 400 mm isotropic emission zone
- Several litres volume at peak flux
- Meter cubed experiments can be accommodated
- Dual-source operation



Flexible Test Configurations

Tailored experimental setups to suit your materials, components, and research objectives.

Extended Irradiation Campaigns

Support long-duration studies requiring significant fluence accumulation.

- Continuous irradiation campaigns of 50–60 hours per week

Concurrent Sample Testing

Test multiple samples simultaneously to improve throughput, consistency, and cost efficiency.

Real-Time Data Logging

Monitor irradiation conditions throughout testing and correlate exposure data directly with experimental results.

Whether supporting exploratory research, technology development, or formal qualification programmes, Astral Systems delivers the neutron irradiation capabilities needed to validate designs, reduce risk, and accelerate innovation.