



Contribution ID: 56

Type: **Talk**

Tritium breeding and neutronics in the FLARE reactor natural-lithium blanket

Thursday 5 February 2026 14:30 (30 minutes)

First Light Fusion has recently launched its FLARE concept, end-to-end proposal from fusion reaction to fusion reactor. (FLARE= Fusion Via Low-Power Assembly and Rapid Excitation)

The dt fuel is magnetically compressed to high densities 'slowly' without heating using a current pulse from a low-voltage, low-power machine (driver) and then rapidly ignited –an established and well documented process known as Fast Ignition.

The reactor is based on a large pool of natural lithium which appears capable of simultaneously providing, first wall, tritium breeding, energy capture, energy gain, coolant and shock mitigation functions.

The low voltage driver means that the high current end of the machine does not need to be under vacuum. As a consequence, liquid lithium can be present in the chamber in substantial quantities, affording very high solid-angle coverage and blanket thickness.

The results of recent neutronics work will be presented showing high TBR ratios and energy capture are possible using a natural lithium blanket (without neutron multipliers or Li6 enrichment), as the native fusion neutron spectrum is available to the lithium.

The thick blanket also leads to low DPA figures and long vessel lifetimes.

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Session Classification: Session 3-11