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## **Commissioning the Rutherford Appleton Laboratory (RAL) Scaled Penning Surface Plasma Source**

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A new Penning surface plasma source has been developed with a larger plasma volume with double the linear dimensions of the standard ISIS source. The standard ISIS source has successfully delivered beam for ISIS operations for over 30 years. A variation of this source [1], with the same plasma dimensions is currently being used for the Front End Test Stand (FETS) at RAL. However it has been demonstrated that the existing design cannot deliver the full 2 ms 50 Hz 60 mA beam requirements [2].

The new source described in the paper should deliver the full duty cycle requirements for FETS, produce higher beam currents and yield longer lifetimes for ISIS operations when run at lower discharge currents. Electrode heaters will allow lower duty factor operation and pre-operation heating. Thus reducing reliance on the use of destructive DC discharges to achieve operational temperatures. This is especially important for FETS commissioning because daily source shutdowns are planned.

This paper gives a status update of the FETS project, details the new source design and provides initial results.

### **References**

- [1] D.C. Faircloth et al., “The front end test stand high performance H<sup>-</sup> ion source at Rutherford Appleton Laboratory”, *Review of Scientific Instruments*, Volume 81, Issue 2, (2010).
- [2] D. C. Faircloth et al., “Optimizing the front end test stand high performance H<sup>-</sup> ion source at RAL”, *Rev Sci Instrum* 82 (2, Part 2) 02A701 (2012).