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Scaled Penning Source Developments

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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 scaled source was developed to: 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. This paper covers the development work through preliminary tests and two prototypes. The current performance of the latest source is detailed.

References

[1] D.C. Faircloth et. al., "The front end test stand high performance H^- 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^- ion source at RAL", Rev Sci Instrum 82 (2, Part 2) 02A701 (2012).

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