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Operation and Optimization of a Negative Hydrogen Ion Source for BNCT Applications

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A compact, cesium-free negative hydrogen ion source has been deployed as part of a boron neutron capture therapy (BNCT) accelerator system. The source, based on D-Pace hardware, is supported by ancillary systems developed by TAE Life Sciences and delivers a stable beam with currents up to 15 mA. It supports reliable and efficient operation across a range of beam currents, making it suitable for both routine clinical operation and experimental use. The source operates in both DC and pulsed modes, providing flexibility that is particularly valuable during system commissioning, tuning, and troubleshooting.
A fully automated control system enables hands-free operation. The system includes extensive logging of operational parameters and diagnostics, supporting fast interlocking, real-time monitoring, trend analysis, and consistent long-term performance. This work illustrates the successful adaptation of a commercial ion source into a medical accelerator system with enhanced control, reliability, and operational flexibility.

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