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Facilitation of High Voltage Conditioning and Improvement of High Voltage Holding in the large Surface-Plasma Negative Ion Sources with Cesium Deposition

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The large long-pulsed surface-plasma sources of negative ions with the multi-aperture multi-electrode Ion Optical System (IOS) are under development at Budker Institute of Nuclear Physics. The directed deposition of cesium to the plasma grid surface is applied in the sources to enhance the negative ion production and to decrease the co-extracted electron flux. The essential feature of the large BINP sources is an active temperature control of the IOS electrodes by circulation of hot thermal fluid through the channels, drilled in the electrode bodies [1]. This heating prevents accumulation of cesium on the IOS electrodes and improves the source high voltage conditioning and holding capacity. The effect of IOS high voltage conditioning and high voltage holding capacity improvement due to IOS heating was studied for the various regimes of operation including the full-scale beam production and acceleration. The procedure of IOS conditioning and the data obtained with the source having the temperature controlled IOS electrodes are discussed.

References

[1] Yu. Belchenko, A. Gorbovsky, A. Ivanov *et al* ”Negative ion production in the RF multiaperture surface-plasma source Multiaperture Negative Ion Source”. AIP Conf. Proc. **1655**, 040002 (2015).