

Abstract Submitted
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Improved Nonambipolar Electron Source operation with permanent magnets JESSE GUDMUNDSON, Dept. Engineering Physics, UW-Madison, Madison, Wisconsin 53706, NOAH HERSHKOWITZ¹, Dept. Engineering Physics, UW-Madison, Madison, Wisconsin 53706 — The Nonambipolar Electron Source (NES), is a Radio Frequency (rf) plasma-based electron source that does not rely on electron emission at a cathode surface. All electrons are extracted at an electron sheath through a biased ring and all ions are lost radially to a biased Faraday shield. The electromagnetic B field in the original NES has been replaced by a NdFeB permanent magnet array. The magnet array consists of a ring of radially aligned magnets followed by a ring of axially aligned magnets producing a peak field of approximately 850 Gauss. Measurement of the magnetic field was in good agreement with field predicted by the FEMM code. Optimization of the single turn antenna and biased ring will be discussed. Operating with argon, at least 15 A of electron current was extracted using a flow rate of 15 sccm Ar at approximately 10 mTorr and 600 W of RF power at 13.56 MHz. For comparison, the original NES required 1200 W of power to achieve 15 A of extracted current. Compared to the previous coil design, the NdFeB magnets are lighter weight, require no power, and provide a greater peak magnetic field.

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Noah Hershkowitz
Dept. Engineering Physics, UW-Madison, Madison WI 53706

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