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## Emittance measurements of ion beams extracted from a prototype microwave ion source using the Slit-Grid technique

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In recent years the need to produce low charge state ion beams with good beam quality and ion sources with good gas efficiency are on an increasing demand. The various applications of these specific ion beams are ranging from radioactive ion beam production to high energy ion implanters. The Accelerator Physics Department at iThemba LABS has developed a prototype microwave ion source. The source consists of a ceramic plasma chamber, a four bar permanent-magnet arrangement and a coaxial microwave feed. This paper involves measurements that were carried out to characterize the ion beam quality from the source. A slit-grid emittance device with a computer controlled data acquisition system was used to measure the transverse phase space distribution of ion beams. These measurements included beam RMS-emittance with noise filtering and TWISS parameter determinations. The beam emittance is fundamentally inferred by taking spatial and angular positions of beam-lets of particles and mapping it into a four-dimensional phase space.

**Level (Hons, MSc, <br> &nbsp; PhD, other)?**

MSc

**Consider for a student <br> &nbsp; award (Yes / No)?**

Yes

**Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?**

Yes

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