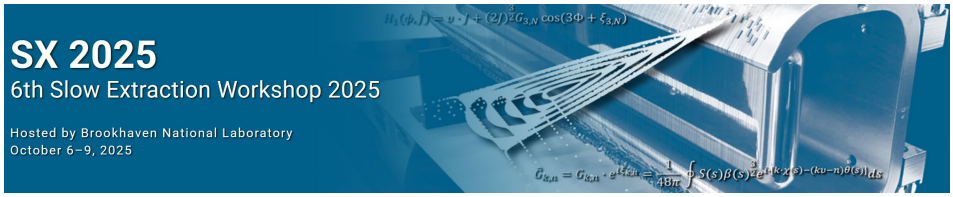

Contribution ID: **24** Type: **Poster**

Rastering vs nonlinear optics for ion irradiation applications

Ion beam irradiation of integrated circuits is important for space and aerospace applications. It is important to irradiate specified areas of a target with a well-defined dose. The present state of the art is to transform the transverse ion beam distribution from Gaussian to a uniformly-filled shape that is large enough to fill the slit of a tungsten collimator. Uniform transverse density distributions are also important in spallation applications. We will present a comparison of two approaches that can remove the collimator, offering a cleaner, more flexible and more accurate irradiation facility. An approximately uniform particle flux can be achieved over arbitrary rectangular domains by rastering the Gaussian beam in two dimensions. An alternative approach is to use nonlinear optics – typically placing two octupole magnets (optionally with duodecapole field components) in the beamline [2]. We will present a systematic comparison of these two approaches for a proposed irradiation facility. The possibility of machine learning based automation will be considered.

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