**What is FAUST?**

The Forward Array Using Silicon Technology (FAUST) is a cluster of detectors used to detect charged particles originating from reactions of heavy nuclei. Study of such reactions constrains the Equation of State of nuclear matter, which in turn can give insight into the formation of atomic elements.

**Improved Position Calibration of the FAUST Array**

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**Purpose**

To design a more effective electron shield for the array and a position calibrator for new Dual-Axis, Dual-Lateral (DADL) detectors. The current shielding design leaves the possibility for a particle to travel through multiple electron absorber foils, which may result in an inconsistent energy loss and possible particle misclassification.

**MOTIVATION**

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**CONSTRUCTION**

- 68 detector telescopes distributed amongst five rings
- Each telescope measures energy deposited in the Si detector and the CsI crystal
- 1.5-3.6 effective detection range from Z axis

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**Electron Attenuation Tunnel**

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- 1.4 micron aluminized Mylar film tunnel along Z axis
- 2 part assembly: aluminum support cuffs to hold the tube form and an insertion rod to install the tube while the array is fully assembled.

**DESIGN**

In the pattern design, two holes were placed equidistant from the corner of the detectors. A third hole was placed to break the symmetry, and thus indicate the presence of a rotation, if any.
- .025 cm thick Tantalum construction
- very dense, yet reasonably machinable; blocks particles at very thin thicknesses

**Position Calibration Mask**

**Position Calibration Mask**

- Equipment, Equirestive surface
- 6 signals per detector: Left, Right, Top, Bottom, and 2 Guard rings
- allows observation of the precise position of an event on a detector

**Future Work**

One of the planned upgrades for FAUST is the replacement of the silicon wafers with Dual-Axis, Dual-Lateral resistive silicon detectors. These DADL detectors will provide better angular resolution and be used to study asymmetry energy through the correlation functions of particles produced in a reaction.

**SRIM**

- Calculates energy loss of particles through mediums
- Energy absorption is too great

**Effective size of hole**

**Effective size of hole**

- Effective Mylar thickness experienced by particles that hit a detector varies greatly for different trajectory angles

**SRIM**

- Calculates energy loss of particles through mediums
- Energy absorption is too great

**Monte Carlo pictures courtesy of A. McIntosh, P. Cammarata, M. Youngs**

**Challenges**

- Machining capabilities: very small (#80 drill bit) on dense metal constrains holes to be drilled straight, rather than at an angle
- Large projection of pattern onto back ring

**Future Work**

A Monte Carlo simulation was written to predict events registered in the detectors with and without the mask in place. This run predicts that the mask should be effective for rings C-E, and questionable for rings A, and B. The elliptical distortion of the hole projections is due to the 2 dimensional nature of the simulation, which neglects the detectors' tilt in the Z axis.

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