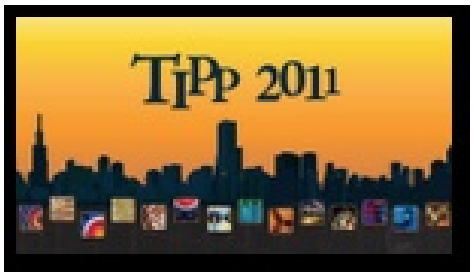

Contribution ID: **276** Type: **Poster Presentation**

Electro-optic Detector for Charged Particle Tracking

We present a new detector technology, an electro-optic detector that can be used for charged particle tracking for future particle detectors. This detector measures the position of charged particles when they interact with an electro-optic crystal such as KH2PO4 (KDP) through a change in the index of refraction caused by the linear Pockels' effect. Specifically, charged particles create a local change in an electric field inside of the crystal due to the creation of electron-hole pairs through ionization and proportionally, a change in the index of refraction. This change in refractive index can be measured by probing the crystal with laser light through a cross-polarized analyzer. Laser photons whose polarization has been changed due to the radiation induced index change in the crystal can then be detected remotely by a photo-detector. The electro-optic detector has many potential advantages over current detectors such as: a wireless readout system, particle positions are measured by laser photons which propagate to a detector instead of collecting charge within a material, and the signal strength is dependent on the external probe laser, which can be user adjusted. Here, we will present experimental results showing the timing and signal size of detection for muons and gammas interacting in the crystal.

This work is funded by the DOE/NNSA Office of Nonproliferation Research & Development, Special Nuclear Material Movement / Radiation Sensing Program. Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Authors: BRUBAKER, Erik (Sandia National Laboratories); SADLER, Lorraine (Sandia National Laboratories)

Co-authors: HOOPS, Alex (Sandia National Laboratories); SHIMIZU, David (Sandia National Laboratories); STRECKER, Kevin (Sandia National Laboratories); MARLEAU, Peter (Sandia National Laboratories); BISSON, Scott (Sandia National Laboratories); NEEL, Wiley (Sandia National Laboratories)

Presenter: BRUBAKER, Erik (Sandia National Laboratories)

Track Classification: Semiconductor Detectors