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Author(s): K. Chung, J.A. Green K.N. Borozdin, M. Brockwell, G. Hogan, F.G. Mariam, and C.L. Morris.

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Calibration and optimization of proportional counter modules using Garfield.

K. Chung, J. A. Green, K. Borozdin, M. I. Brockwell, G. E. Hogan, F. G. Mariam, and C. L. Morris.

Prototypes of radiation detector arrays used for charged-particle radiography require initial calibration to correlate the distribution of electron arrival time to the particle track locations. This step is crucial to obtaining the spatial resolution necessary to separate particle tracks traversing the individual proportional counters in the arrays. Our past attempts to use cosmic rays alone for the initial calibration have fallen short of obtaining the desired resolution due to the insufficient cosmic ray flux to provide the necessary number of particle tracks. A theoretical relation between electron drift time and radial drift distance is obtained with Garfield, a CERN gas detector simulation program. This relation is then used as an effective starting point for the initial calibration and results in a shorter calibration period and improved spatial resolution of the detectors.