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Time resolution of single cell 3D devices on SPS pion beams

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The proven potential of 3D pixel at higher than $10^{16} n_{eq}/cm^2$ radiation fluences, in combination with a small cell approach, makes them an ideal choice for a precision timing tracker. In this study, the timing resolution of several different geometry 3D pixel cells is presented using 160 GeV SPS pion beams. Through a varied incidence angle study, field uniformity, Landau contribution and collected charge are studied at incidence angles of $+/- 12^\circ$. Using state of the art numerical methods, the choice of instrumentation on signal composition and induced result bias is also evaluated. The study is expanded for four radiation fluences, up to $10^{17} n_{eq}/cm^2$ with the use of the EUDAQ telescope, providing sub-pixel timing maps with a $5\mu m$ spacial resolution.

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