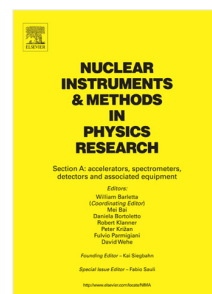


## Accepted Manuscript

Overcoming the planar contact geometry limitation for the measurement of transport properties and electric field distribution in X- and gamma ray detectors

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1 **Overcoming the planar contact geometry limitation for the**  
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4

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13 Abstract

14 Laser induced transient current technique (LI-TCT) was proven to be a  
15 successful tool for measuring at the same time carrier lifetime, carrier mobility,  
16 and electric field distribution in X- and gamma ray detectors with plain contacts  
17 on opposite surfaces. Unfortunately, the most performing detectors exploit more  
18 complicated contact geometries that, hindering hole contribution to signal  
19 formation, allow a much better spectroscopy. In this paper, a LI-TCT based  
20 method is presented, for the determination of transport parameters as well as  
21 electric field distribution directly in single carrier devices. The method's validity  
22 is demonstrated in twin CdZnTe detectors having similar material properties,  
23 but different weighting potentials.

24

25 Introduction

26 CdZnTe X- and gamma ray detectors are widely used for medical applications [1],  
27 environmental control [2], and security [3]. The realization of high quality  
28 detectors depends on the availability of CdZnTe crystals with optimal carrier  
29 mobility-lifetime product. This can be determined by irradiating a planar  
30 detector using alpha particles [4] or low energy x-rays [5] to create electron-  
31 holes pairs. The collection efficiency as a function of applied voltage is fitted by  
32 the use of Hecht equation [6]. Also photoconductivity measurements allow the  
33 determination of mobility-lifetime product, once surface recombination is taken

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