

# Narrow-beam X-ray tests of CCD edge response

Stephen Kuhlmann · Harold Spinka · Joseph P. Bernstein ·  
Kevin A. Beyer · Lisa M. Gades · Thomas E. Kasprzyk ·  
Antonino Miceli · Richard A. Spence · Richard Talaga

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**Abstract** The physical boundaries of a fully-depleted CCD can lead to distorted field lines and non-uniform response. We study this response with a beam of X-rays constrained to a width of less than one pixel (15  $\mu\text{m}$ ), and a system to map the CCD response as a function of transverse position.

**Keywords** CCD · X-ray · Dark energy Survey

## 1 Introduction

Detailed characterizations of charged-coupled devices (CCDs) are necessary for future astronomical surveys such as the Dark Energy Survey (DES) [1]. DES is constructing a 520 megapixel CCD camera to be mounted on the Blanco telescope at the Cerro Tololo Inter-American Observatory. Measurements will be made in visible wavelengths (the CCDs will have a high red sensitivity) to obtain dark energy parameters with several techniques, including weak gravitational lensing, galaxy cluster counts, type Ia supernovae distances, and galaxy angular clustering. In this paper we are investigating an aspect of DES CCDs not addressed in [1], the response near the physical edges of the CCD. It is known that the edge distorts the field lines of the CCD, leading to larger effective pixel sizes and larger responses to a flat field illumination [2]. Figure 14 of reference [2] shows a model of field line distortion

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S. Kuhlmann (✉) · H. Spinka · J. P. Bernstein · K. A. Beyer · L. M. Gades ·  
T. E. Kasprzyk · A. Miceli · R. A. Spence · R. Talaga  
Argonne National Laboratory, 9700 South Cass Avenue, Lemont,  
IL 60439, USA  
e-mail: kuhlmann@anl.gov