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Hard X-Ray, Gamma-Ray, and Neutron Detector Physics X

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Editors

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Introduction

This book contains the proceedings of the SPIE conference on Hard X-Ray, Gamma-Ray and Neutron Detector Physics X. The conference was held August 11-13, 2008 in San Diego, CA. The conference was organized into technical sessions on cadmium zinc telluride (CZT), cadmium telluride, scintillators, imaging, novel semiconductor gamma-ray detectors, and applications.

The purpose of the conference was to provide a forum for scientists and engineers from the detector development and user communities to present and evaluate the most recent results on x-ray, gamma-ray, and neutron detectors, and to discuss the requirements for a variety of radiation-sensing and imaging applications. The primary theme of the conference was on development of improved semiconductor and scintillator radiation detectors and imaging arrays, which combine the advantages of room-temperature operation with the ability to spectrally resolve the energies of emitted x- and gamma-rays. By eliminating the cryogen, new radiation-sensing instruments, such as spectrometers and gamma cameras, can be manufactured that are portable, lightweight, easy to operate, and relatively maintenance-free. Recent research and development on detectors have resulted in measurable progress in the availability of single detectors and imaging arrays. In addition, recent reports of the material properties limiting the performance of cadmium zinc telluride gamma detectors have provided new insights and directions to address deficiencies in the crystals and detectors.

Despite the limitations on efficiency and relatively high cost of current room-temperature semiconductor detectors, they have been increasingly deployed in systems useful for medical diagnostics, space applications, safeguarding of nuclear materials, x-ray fluorescence, position sensing, and gamma-ray spectroscopy. Although significant progress has occurred over recent years, there is still a pressing need to lower the cost of the detectors and to increase the efficiency of room-temperature semiconductor detectors without degrading their spectral performance.

A total of 49 presentations, oral and poster, were given at the conference. Although the number of attendees varied with the session and day of week, the attendance averaged approximately 60 people, with a substantial fraction of those in attendance representing organizations outside of the U.S. Some of the sessions drew more than 100 attendees.

This book provides detailed documentation describing 38 of the presentations. The editors hope that it will serve as an important record of the meeting, provide an update on the status of x-ray, gamma-ray, and neutron detector technology, and serve as a useful source of information for those working in the field.

The conference chairs would like to thank the session chairs and members of the conference program committees, who offered their time to enlist the involvement of many researchers working in the field.

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