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

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Editors

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Preface

This book contains the proceedings of the SPIE Conference on Hard X-Ray, Gamma-Ray and Neutron Detector Physics XXV. The conference was held on 21-22 August 2023 in San Diego, CA. The conference was organized into multiple oral technical sessions on semiconductors, inorganic scintillators, detector systems, X-ray/gamma imaging, advanced detector concepts, and applications. Additionally, a poster session was provided. The conference also included two plenary presentations as part of the X-Ray, Gamma-Ray and Particle Technologies Track – (1) FLASH Radiotherapy: A New Cancer Treatment Modality and its Physics, Engineering, and Biology Challenges by Professor Magdalena Bazalova-Carter from University of Victoria (Canada), and (2) Recent advances in X-ray, Gamma-Ray and Charged-Particle Imaging by Professor Lars R. Furenlid from University of Arizona.

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, and on applications of the technology. By eliminating the cryogen, new radiation-sensing instruments, such as spectrometers, gamma cameras and radiographic systems, can be manufactured that are portable, lightweight, easy to operate, and relatively maintenance-free. Presentations on the properties affecting the performance of semiconductor and scintillator detectors provided new insights and directions to address deficiencies in the detectors.

Despite the limitations on efficiency and cost of current room-temperature semiconductor and scintillator detectors, they are being increasingly deployed in systems useful for medical diagnostics, astronomy, science applications, position sensing, computed tomography, gamma-ray spectroscopy, and nonproliferation. Despite significant progress over recent years, there is still a pressing need to lower the cost of the detectors and further increase the efficiency of the detectors while improving their spectral performance.

A total of 36 presentations, including 5 posters, were included in the technical program. This volume provides documentation describing a portion 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 resource for those working in the field.

The Conference Chairs would like to thank the session chairs and members of the Conference Program Committee, who offered their time to enlist the involvement of researchers working in the field. We also express our indebtedness to all authors who contributed to the proceedings, and to the SPIE staff for their excellent cooperation and continuous support during the conference call, organization, and proceedings preparation.

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