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Medical Applications of Radiation Detectors

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Editors

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Contents

DIGITAL RADIOGRAPHY AND OTHER

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2 Radiotherapy
Douglas J. Wagenaar, Consultant (United States)

3 Detectors and Applications
Hans Roehrig, Health Sciences Center, The University of Arizona (United States)

4 Digital Radiography and Other
Heather L. Durko, College of Optical Sciences, The University of Arizona (United States)

Introduction

At first look, this conference, Medical Applications of Radiation Detectors, might appear to be a new conference. Actually it has been around for a long time with different names. In 1999, the conference "Medical Applications of Penetrating Radiation" was initiated at the SPIE Optics and Photonics meeting in Denver with co-chairmen: H. Bradford Barber and Hans Roehrig. The conference was intended as a sister conference to "Hard X-Ray, Gamma-Ray, and Neutron Detector Physics" and "Penetrating Radiation Systems and Applications." In subsequent years, the medical conference was merged with "Penetrating Radiation Systems and Applications" where it flourished for a decade as about half of that conference. This year, the medical conference again goes it alone with a new name and the addition of a new co-chair, Douglas J. Wagenaar.

Research on new Medical Applications concentrated on the two traditional radiation imaging fields of x-ray radiography and nuclear medicine. Photon-counting x-ray radiography and computed tomography is closer to fulfilling its promise of dose reduction, contrast enhancement of soft tissues, and identification of specific, low-atomic number materials. Exploitation of superior energy resolution in semiconductor radiation detectors was reported for a Compton spectrometer. Nuclear Medicine techniques ranged from densely-pitched silicon detectors for gamma-ray microscopy, new designs for dedicated prostate SPECT imaging, and an innovative robotic SPECT imaging system for the radiation therapy suite. The field of Molecular Breast Imaging (MBI), highlighted in the plenary session, uses nuclear medicine with dedicated breast scanners to detect small, early-stage breast cancer with high diagnostic accuracy (sensitivity, specificity). Unlike mammography, the diagnostic performance of MBI is unaffected by radiographically-dense breast tissue. In mammography, detection sensitivity is less than 50 percent in women with dense breasts, and to compound the problem dense breast tissue is a leading risk factor in the development of breast cancer. This presents a significant opportunity for MBI to emerge as a new modality to impact the early detection and successful treatment of breast cancer.

An intriguing addition to this conference was a presentation on the use of micro- and nano-particles for drug delivery; it described an impressive use of techniques from electronic circuit production for direct medical engineering.

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