

Tuesday, 5th Februar 2019, 13:00 (*Light refreshments will be served at 12:30*)
Campus Schenefeld, XHQ, room E1.173

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From Single GaAs Detector to Pixelated Sensor for Radiation Imaging Camera

The Slovak University of Technology in Bratislava and the Slovak Academy of Sciences in Bratislava have become partners in research of bulk SI (semi-insulating) GaAs detectors for digital imaging almost 20 years ago.

Our collaboration was aimed firstly to optimization of the detector fabrication process and improvement of the detector quality. We have obtained the energy resolution of 7.2 % for 122 keV photons decreased to 5.3% by cooling the detector to 255 K. The typical charge collection efficiency of our SI GaAs detectors is between 85 and 88%. The radiation hardness of developed SI GaAs detectors against gamma-rays, neutrons and also high energy electrons is under study with results predicting two orders of magnitude higher radiation resistivity in comparison with traditional silicon detectors.

Besides this research, we have focused on development of various X-ray imaging systems. We started with moving one single detector in two dimensions, where we obtained a spatial image resolution of 500 μm but the exposition period was of several hours. Later we prepared a digital X-ray scanner composed of 480 strip detectors in one line scanning an area of 12 \times 15 cm^2 and obtaining the spatial resolution of 250 μm . This fully homemade scanner shortened the exposition time to several minutes. Finally, we have fabricated a two-dimensional system of 256 \times 256 pixel SI GaAs detectors covering an area of 1.4 \times 1.4 cm^2 suitable for Timepix read-out chip, developed by the MEDIPIX2 collaboration. Its successful application to Timepix read-out chip led to creation of 2D pixelated detector (radiation imaging camera) with basic spatial resolution of 55 μm and exposition period in the range of not more than a few seconds.

Host: Markus Kuster