FAKULTÄT für PHYSIK
LUDWIG-MAXIMILIANS-UNIVERSITÄT
MÜNCHEN/GARCHING

PHYSIK-DEPARTMENT
TECHNISCHE UNIVERSITÄT MÜNCHEN
MÜNCHEN/GARCHING

Garchinger Maier-Leibnitz-Kolloquium

Donnerstag, 15.07.2021, 16^{15} Uhr

Online via ZOOM:

https://lmu-munich.zoom.us/j/98457332925?pwd=TWc3V1JkSHpyOTBPQVlMelhuNnZ1dz09

Meeting ID: 984 5733 2925
Passcode: 979953

Prof. Kai Vetter

(University of California, Berkeley, Lawrence Berkeley National Laboratory & Berkeley Institute for Resilient Communities)

Advances in radiation imaging and mapping: From cancer verification to nuclear emergency response

Recent developments in radiation detectors and data processing enable new means to map and visualize nuclear radiation in a wide range of applications, including the development and use of new radiotracers or particle beams for disease diagnostics or treatment purposes. Enormous advances have been achieved in enhancing more conventional approaches in gamma -ray imaging exemplified by the Explorer for human-scale PET imaging or high-resolution SPECT systems for small animal studies. However, conventional approaches in gamma-ray imaging are insufficient in realizing the full potential of radio-biologically highly efficient cancer treatment methodologies such as targeted alpha particle therapy or external beam ion-cancer therapy which require gamma-ray imaging capabilities over a broad range of energies. I will discuss some of our efforts to provide gamma-ray imaging for energies ranging from below 100 keV up to 7 MeV which are based on advanced collimation and coded aperture concepts and collimator-less Compton imaging. In addition, recent advances in computer vision enable unprecedented capabilities in the detection, mapping, and visualization of radiological and nuclear materials even in complex environments. We have developed the multi-sensor fusion concept called 3-D Scene Data Fusion (SDF) that allows us to map scenes in three dimensions and to fuse them with nuclear radiation data in near real time while moving freely through these scenes. This concept provides new means to visualize radiation relevant not only for experts and operators but in the communication with the public. SDF has been realized with commercial gamma-ray spectrometers and imagers as well as custom-made instruments providing omni-directional coded-aperture and Compton imaging in compact configurations on drones, ground-robots, and in hand-portable configurations. I will close with results from measurements performed in Fukushima and in Chernobyl illustrating the power of SDF in the mapping of radiological contamination.

gez. Peter Thirolf
Tel. 289-14064

gez. Norbert Kaiser
Tel. 289-12367