

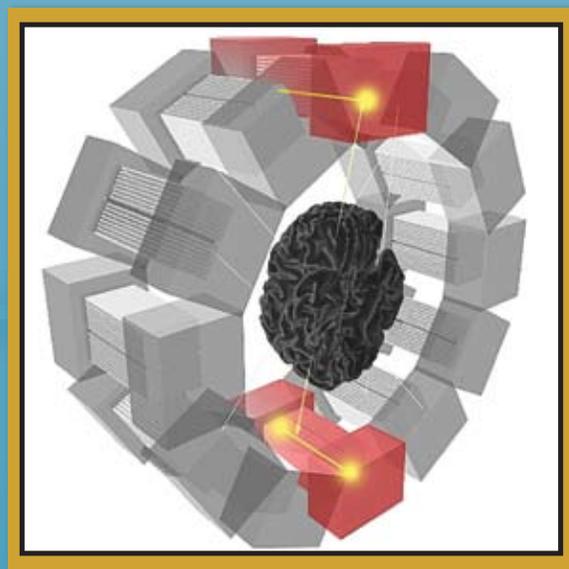
MAY 2, 2007
1:30 PM, 1ST FLOOR
KAVLI AUDITORIUM

SILICON RADIATION SENSORS for Medical Imaging



GUEST SPEAKER –
PETER WEILHAMMER
CERN

The evolution of new techniques and instrumentation in medical imaging has been very important over the last 4 decades. From planar X-Ray radiography with emulsion plates a first big step was the introduction of X-ray Computed Tomography (CT) and Anger Single Photon Emission Computed Tomography (SPECT) in nuclear imaging, followed by first attempts introducing Positron Emission Tomography (PET) with gaseous detectors. For a long time, and still now, most clinical imaging devices in use in hospitals and medical cabinets are based on detection of photons in scintillation detectors read out by arrays of Photo Multipliers (PM) followed by hybrid readout electronics. The only application of silicon radiation sensors on a bigger scale is in the standard, current mode (integrating) X-ray CT scanners using silicon photo diode arrays for the readout of plastic scintillators.



Solid state radiation sensors, in particular silicon, and highly integrated front-end electronics have had an impressive impact on High Energy Physics instrumentation. Many instrumentation groups have over the last 25 years attempted to find applications of solid state instrumentation spin-off in medical imaging. In this talk the potential of silicon radiation detectors and highly integrated readout ASICs and recent efforts to investigate and develop new medical imaging devices with substantially improved performance, will be discussed. A short introduction into the basic physics principles of photon interactions and detection in silicon, and the resulting implications for applications of silicon instrumentation in medical imaging will be presented. R&D efforts and recent results in some specific novel projects in this field will be discussed. Included are examples of new devices in Micro-X-Ray CT and in nuclear medicine imaging, SPECT and PET, using silicon instrumentation as an important ingredient. These involve both pre-clinical and clinical applications. Required performance and evaluation of specific detectors and read-out chips will be presented.