

# ADVANCED INSTRUMENTATION SEMINARS

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1:30 PM, 1ST FLOOR

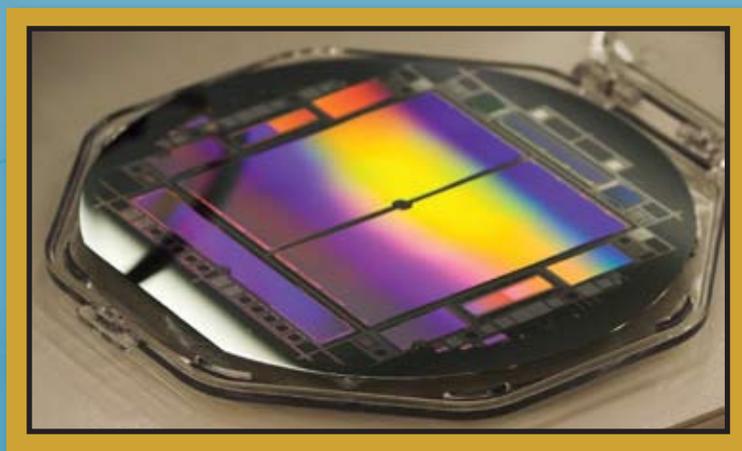
ORANGE ROOM/CENTRAL LAB

## DETECTORS FOR THE EXPERIMENTS AT FLASH, LCLS, SCSS AND XFEL

### The Fine Art of High Speed X-ray Imaging



GUEST SPEAKER –  
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For experiments at the present and future X-ray lasers (FLASH, LCLS, XFEL) we are developing large format backside illuminated fully depleted pnCCDs with column parallel readout. In a first phase a 1024 x 1024 format detector with 75 x 75  $\mu\text{m}^2$  pixels will be ready for use in 2009. The detector chip has recently been fabricated and characterized. The full system will be described in detail and its prospects will be discussed in the light of the potential applications. In phase II a 2048 x 2048 format system will be made available. The design of the pnCCD is being finished, fabrication starts in early 2009; the system could be ready for use in 2011 for phase II. Recently we have performed two demonstrator experiments with a 256 x 512 format pnCCD system (a) at the white X-ray beam of BESSY with energies up to 30 keV and (b) with monochromatic radiation of 90 eV at the FLASH X-ray (VUV) laser. Due to the high frame rate of the pnCCDs the measurements were made in a full frame mode with up to 500 frames per second. The results of both experiments will be presented; the prospects of future experiments will be discussed. The results obtained at the synchrotrons are in good agreement with the pnCCDs performance in the laboratory.

The second part of the presentation discusses the 5 MHz imager for the XFEL facility, most probably operational in 2014. The bunch structure of the accelerator requires data taking with a spacing of only 200 ns between subsequent images. A new concept was established making use of the DePMOS active pixel sensor technology where every individual pixel contains its own preamplifier, ADC and local memory. The preliminary designs on the basis of simulations have been finished.