



## **DoNuTS Technical Meeting**

**Time:** 1600 Wednesday, 14 October 2009

**Place:** NE Conference Room, 1106 Etcheverry

**Speaker:** Ilbeyi Avci, UC Berkeley Physics

**Subject:** Development of a Full Wafer Fabrication Process  
for Integrated Scientific CCD and Silicon Strip Detectors

The potential of using fully-depleted, high-resolution scientific CCDs in the detection of Compton electron trajectories has been shown recently by the BEARING's gamma-ray imaging group. In order to produce an implementable detector that can be used for electron-track Compton imaging systems, the readout time of the scientific CCD detector must be reduced from order seconds to microseconds. To this end, we are developing a new type of detector system by coupling scientific CCD and silicon strip detectors on a single substrate. This will enable the imaging capabilities of the CCD coupled to the fast timing of the strip detector. Scientific CCD and silicon strip detectors have both been well researched and both have mature industrial CMOS processes. However, critical issues and challenges emerge when integrating these two detector types onto a single silicon wafer due to implementing double-sided semiconductor fabrication processes while maintaining optimal electrical characteristics for front-end readout. Since the strip detectors will be fabricated on the back side of the processed CCD wafers which contain TiN metallization, a controlled fabrication process is needed to be developed for fabricating strip detectors on the back side in order to avoid any degradation on the performance of CCDs. For this purpose, we are developing a full wafer processing technique including low temperature deposition and implantation/isolation procedures. We are also simulating the final device structure on Silvaco semiconductor process simulation software in order to determine optimum process parameters for desired electronic properties and performance of the CCD-S Detectors.