



Project Summary Report

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Reporting Period	<input type="checkbox"/> January 2006 – December 2006 <input type="checkbox"/> January 2007 – December 2007 <input type="checkbox"/> January 2008 – December 2008 <input type="checkbox"/> January 2009 – December 2009 <input checked="" type="checkbox"/> January 2010 – December 2010

Project Number	DESY-TB-2010-02
Project Title	SPiDeR (Silicon Pixel Detector R&D) Collaboration: DECAL subproject
Project Objective (max 250 words)	<p>The SPiDeR collaboration is investigating monolithic CMOS pixel sensors for future collider detectors, in particular high energy lepton colliders (ILC and CLIC). The collaboration is studying both fundamental technologies for future detector sensors and also novel applications of CMOS sensors. These could be applied both to tracking and calorimetry. In particular, the collaboration is studying the feasibility of a digital electromagnetic calorimeter (DECAL). The DECAL would be a new approach to electromagnetic calorimetry where the initial electron or photon energy is estimated by counting particles rather than from the deposited energy. The specific DESY-TB-2010-02 project which took data in March 2010 was to measure electromagnetic core shower densities at high granularity (~50μm) using Tera-Pixel Active Calorimeter (TPAC) sensors, which were developed as study sensors for the DECAL application.</p>
Project Achievement (max. 250 words)	<p>Tungsten sheets of various total thickness were inserted between the front and back layers of a telescope made from six TPAC sensors. A large electron beam dataset was acquired, varying the beam energy from 1 to 5GeV, using between 1 and 13X_0 of tungsten (as well as with no tungsten), for a total of around 30 configurations. In addition, some data with other material (copper and lead) were taken. The dataset for each configuration averaged over 100k events. These energies cover the lower end of the energy range relevant to ILC/CLIC studies and are complimentary to the data taken with BTELE-2010-08 at CERN. The data are still under analysis but preliminary results were presented at ICHEP2010 in Paris this summer, showing the efficiency of the TPAC sensors is very high.</p>