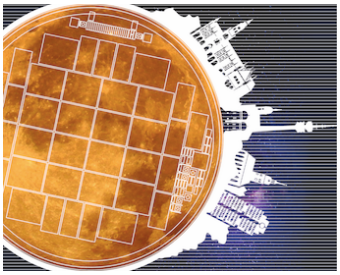

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Performance of the H35DEMO chip monolithic matrices before and after irradiation

Depleted Monolithic Active Pixel Sensors (DMAPS) based on High Voltage CMOS (HV-CMOS) technology are investigated as an option to cover large areas in the outermost layers of the future pixel detector of the ATLAS Inner Tracker (ITk) at HL-LHC.

The H35DEMO is a large area demonstrator chip for ITk developed by the collaboration of KIT, IFAE, University of Liverpool and University of Geneva. It has been produced in AMS 350 nm CMOS technology on wafers with different substrate resistivities ranging from 20 Ω to 1 kΩcm.

The chip is divided in four matrices consisting of active pixels with a 50x250 μm^2 pitch. It features a large fill factor design in which the transistors are embedded in the same deep n-well acting as collecting electrode. Two of the matrices include also digital electronics in the periphery and can thus be operated standalone as monolithic detectors.

H35DEMO chips have been irradiated with reactor neutrons at JSI and with 23 MeV protons at KIT up to the particle fluences expected for the fifth pixel layer of ATLAS at HL-LHC. The performance of the monolithic matrices before and after irradiation has been investigated in different beam test campaigns in 2017 using a readout system fully developed at IFAE. The results of this characterisation will be presented

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