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Active doping profile of silicon detectors using innovative TLM scan method

Improvements of silicon detector technology for high energy physics applications demand the introduction of doping carriers into the sensor material to optimize the charge collection efficiency of the detecting devices. Total doping profile of any silicon sensor device can be measured with very high precision using secondary ions mass spectrometry (SIMS). In this work new 3D SIMS scannig method has been used for phosphorus implantation and total doping map will be shown. The focus is to present an alternative scanning technique based on Transmission Line Method, mainly used in Integrated Circuit and nanotechnology developments. We deduce from TLM method measurements, active doping profiles of planar pixel sensors used for LHC experiment; further target is also to evaluate how active dopants profile changes when pixel sensors are heavily irradiated and how TCAD models can reproduce the data obtained from TLM method.

Primary author: Dr LOUNIS, Abdenour (Laboratoire de l'Accélérateur Linéaire, Orsay)

Co-author: Mrs TASNEEM, rashid (Laboratoire de l'accélérateur Linéaire, Orsay)

Presenter: Dr LOUNIS, Abdenour (Laboratoire de l'Accélérateur Linéaire, Orsay)

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