



Marko Milovanović, *ESR*

-Start date: 1st August 2010. (3 months off due to injury)

- 1 some past background
 - 1 Graduated in July 2007 at the Faculty of Electronic Engineering, University of Niš
 - 2 Master thesis topic: Recognition of human iris patterns for biometric identification
 - 3 Home country: Serbia
- 2 present status:
 - 1 Host institute: Jožef Stefan Institute
 - 2 MC-PAD project: P3 – Radiation Hard Crystals / 3D Detectors
 - 3 Supervisor: Gregor Kramberger
 - 4 Thesis advisor and university: Marko Zavrtanik, Faculty of Electrical Engineering, University of Ljubljana

My work



- Measurement and analysis of highly irradiated silicon sensors using *Edge-TCT* and *Alibava* readout system
- Effects of radiation damage on silicon *micro-strip* detectors
- Performance investigation of 3D detectors

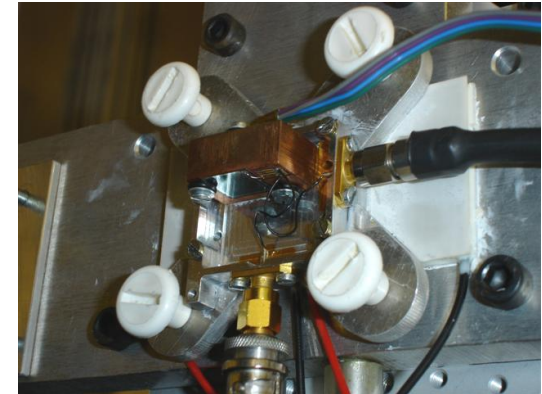
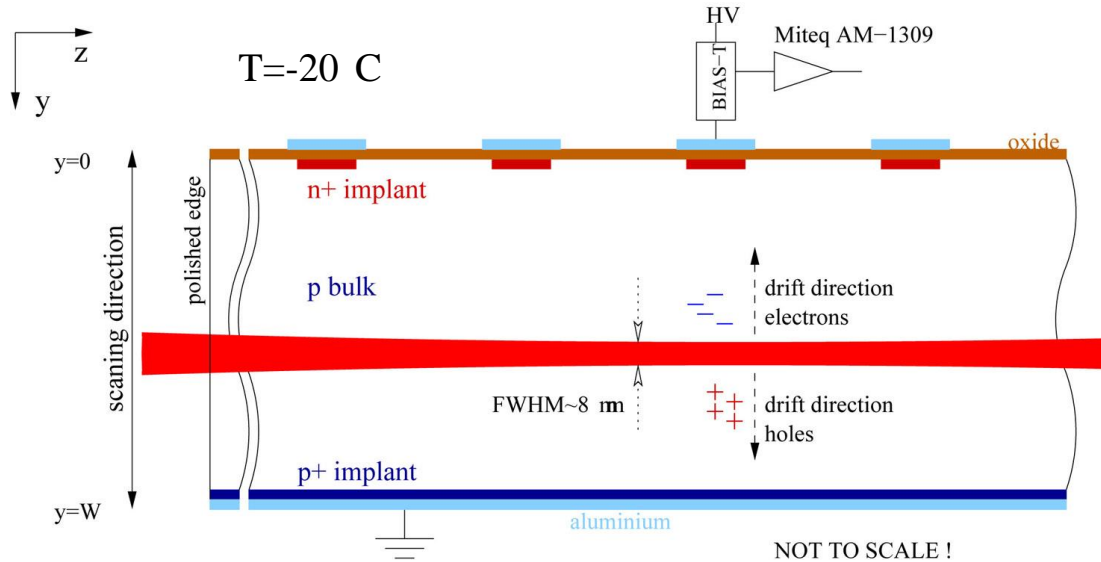
Technical progress



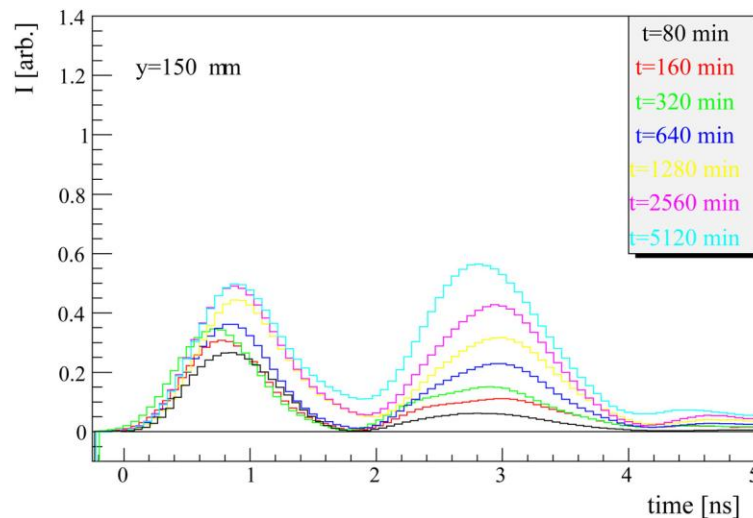
- Various p-type silicon micro-strip detectors investigated using Edge-TCT
- Commissioning of the Alibava readout system, measurements and validation
- Effects of annealing on charge collection efficiency in heavily irradiated sensors

Results (*Edge-TCT*)

The principle of experimental procedure



Detector mounted on a cooling copper support inside the setup



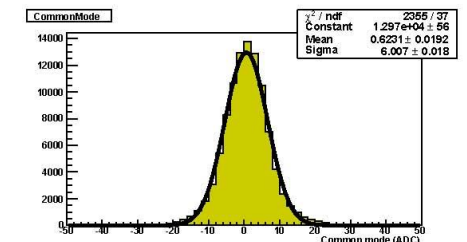
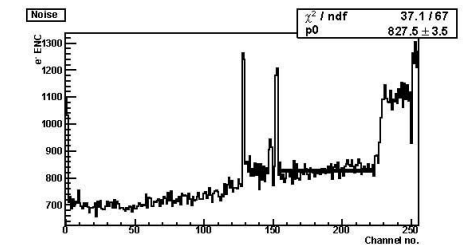
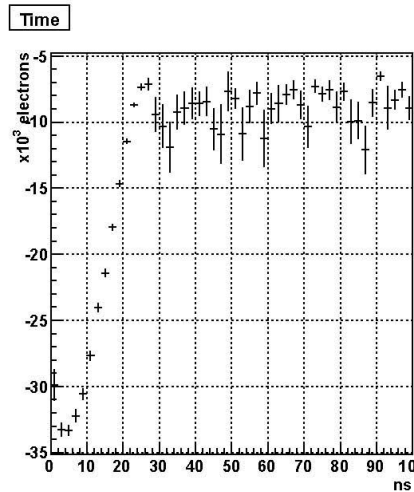
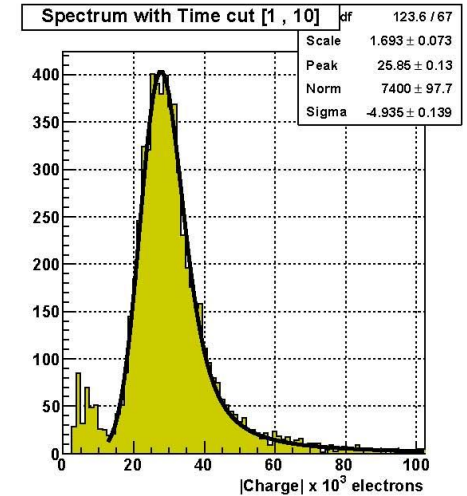
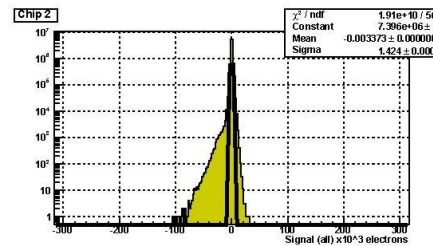
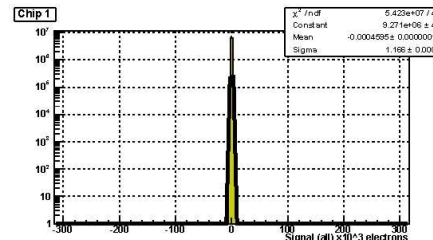
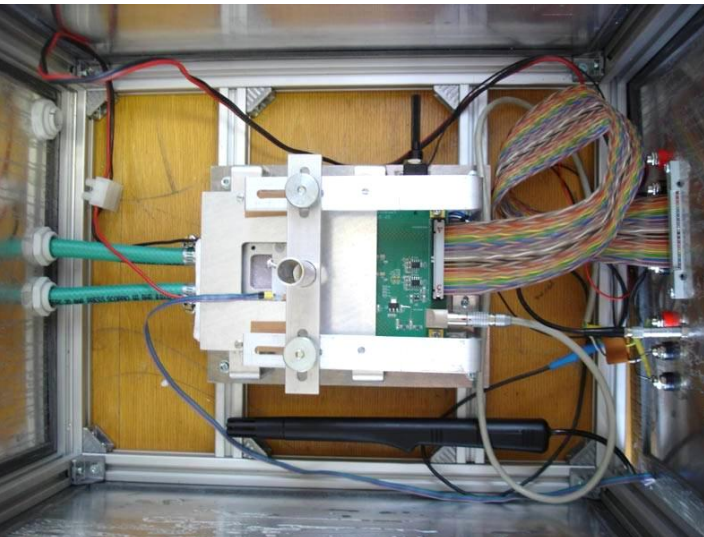
Induced current waveform at -700V (reverse bias) during annealing for $y=150\mu\text{m}$ injection depth

Detector: Micron, FZ-Si p-type micro-strip, $\Phi=5 \times 10^{15} \text{ cm}^{-2}$, $T=-20 \text{ C}$

Results (*Alibava*)

Successful commissioning of the Alibava readout system

Detector: Hamamatsu, FZ-Si p-type micro-strip, non-irradiated, $T=20\text{ C}$

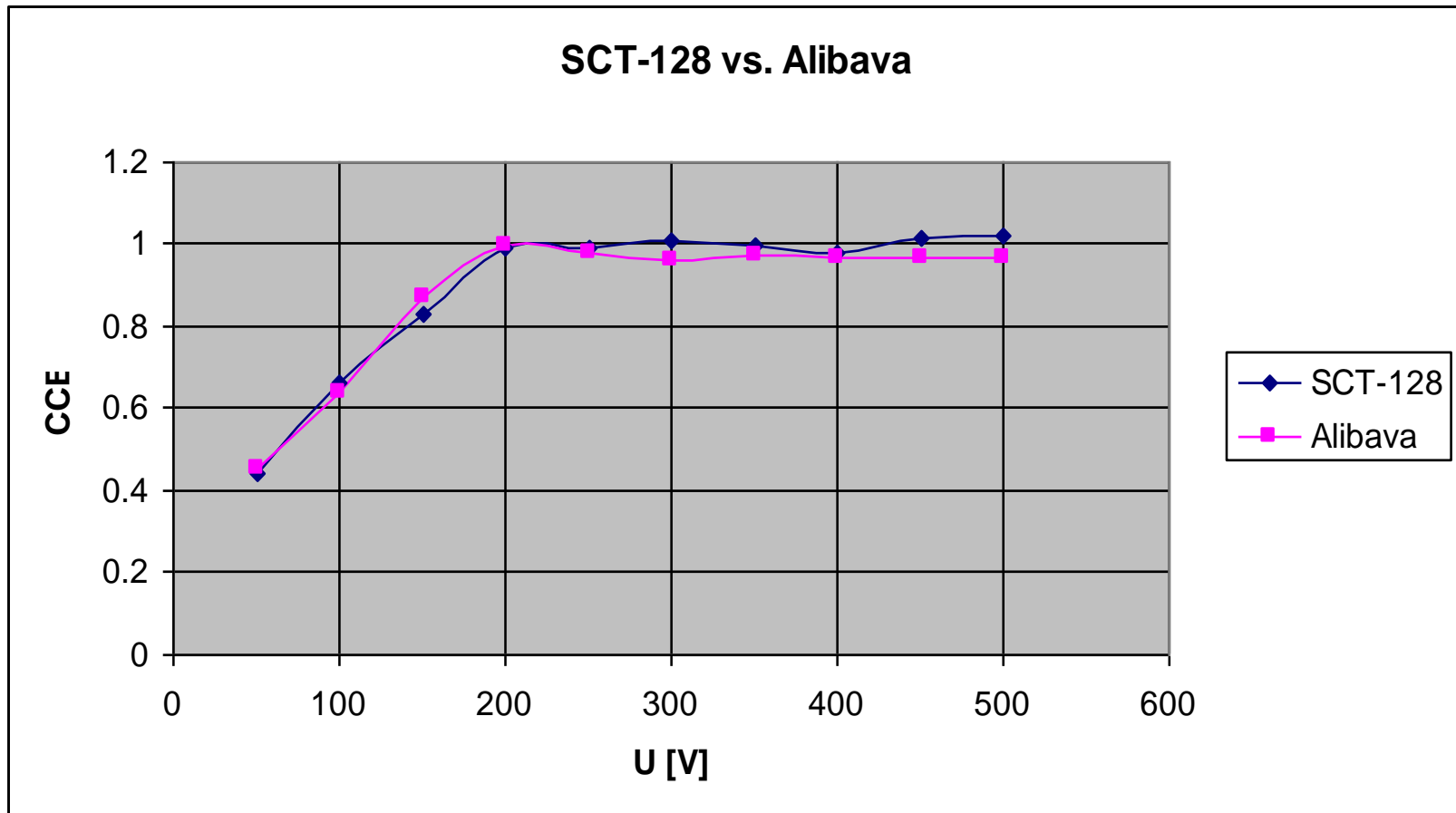


Results (*Alibava*)



Validation – performance comparison with SCT-128

Detector: Hamamatsu, FZ-Si p-type micro-strip, non-irradiated, $T=20\text{ C}$



Impact of my work



- On me: *advanced training, experience, opportunity*
- Science: *highly relevant papers on heavily irradiated p-type silicon sensors*
- Institute: *building and optimizing new setups for detector characterization*
- Collaboration: *providing new data on radiation hard crystals*

Overview - Training



- Courses:
 - Slovene language course
 - Safety course at Nuclear Training Center (ICJT-JSI)
 - PhD study related courses
- Training events:
 - MC-PAD related network training events
 - *Readout electronics (Cracow)*
 - *Data analysis (DESY – Hamburg)*
- Exchanges (secondments):
 - CERN, 01-07. July 2010
 - Pion Irradiation at PSI, 15-22. August 2010

Overview - Results



- Publications:

- articles:

- Investigation of electric field and charge multiplication in silicon detectors by Edge-TCT (*IEEE Trans. Nucl. Sci. Vol. 57(4), 2010, p. 2294.*)
 - Annealing studies of irradiated p-type silicon sensors by Edge-TCT (*in review procedure*)

- thesis preparations:

- A seminar held at the Faculty of Electronic Engineering – Report on research work

Overview - Results



- Presentation:
 - 15th RD50 Workshop (CERN)
 - Annealing studies of a heavily irradiated silicon micro strip detector investigated using Edge-TCT
 - SiC lab weekly group meetings (internal notes)