



# Status of Irradiations

## DEPFETs and MOS diodes

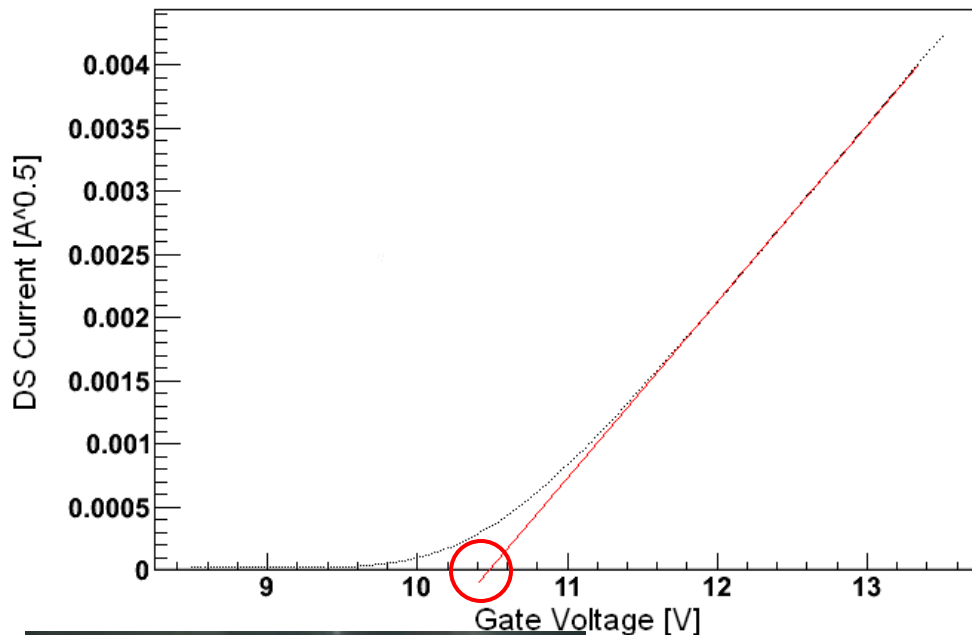
Carried out at the x-ray facility of KIT by

Peter Müller

Andreas Ritter



# DEPFET: Measurement of threshold voltage shift



Up: Typical extraction of threshold voltage from  $I_{DS} - V_G$  data.

Down: X-ray tube at the Karlsruhe Irradiation center.

From: [[http://www-ekp.physik.uni-karlsruhe.de/index.php?option=com\\_content&view=article&id=93&Itemid=12&lang=de](http://www-ekp.physik.uni-karlsruhe.de/index.php?option=com_content&view=article&id=93&Itemid=12&lang=de)]

- 2 Devices under Test
- Irradiation scheme:
  - DUT 1: Zero Voltage at Gate contact
  - DUT 2: Adaptive biasing from Off voltage (5V) to zero voltage at Gate contact
- Threshold voltage via  $I_{DS} - V_G$  measurement
- Mini matrices from PXD 5
- X-ray irradiation carried out in Karlsruhe

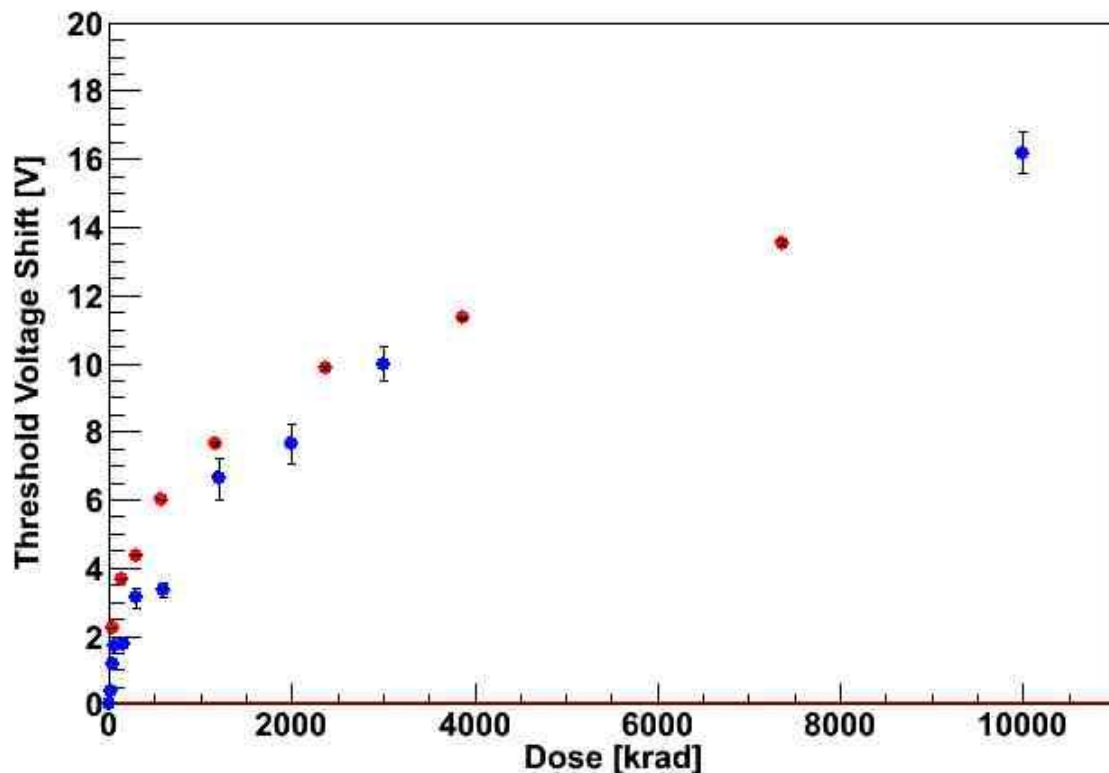


# DEPFET: Results of threshold voltage shift

Observation and conclusions:

- Breakdowns:
  - Short circuit current between layers Poly 1 and Poly 2 with DUT 1 prevented further measurements at higher doses (>7.5 Mrad)
  - 2. DUT still lived after 10 Mrad
- Voltage shift of about 16.5 V at 10 Mrad
- Annealing of threshold voltage shift after approx. 500 h is around 4 V
- Threshold voltage spread over several pixels is under investigation

**Threshold**



Red: DUT 1

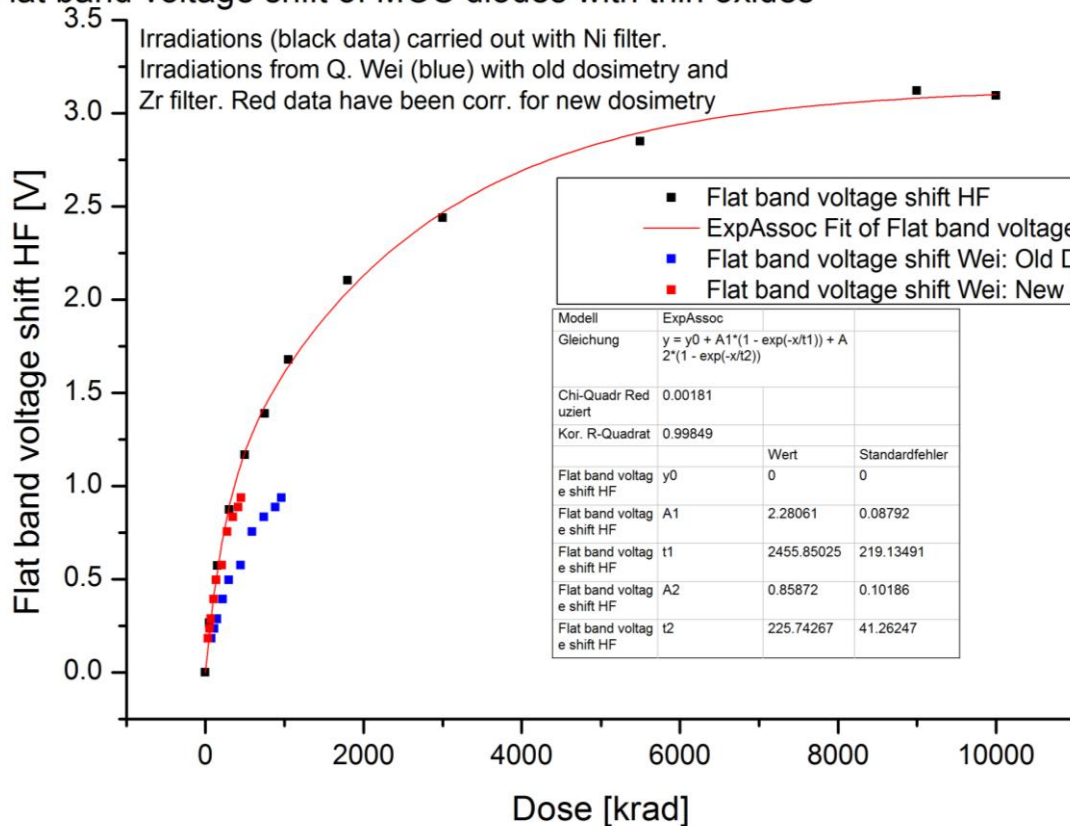
Blue: DUT 2

Measurement done by P. Müller. Voltage errors are based on standard deviation of threshold voltage shifts of 6 pixels.



# MOS diodes: Flat band voltage shift

Flat band voltage shift of MOS diodes with thin oxides



## Tasks:

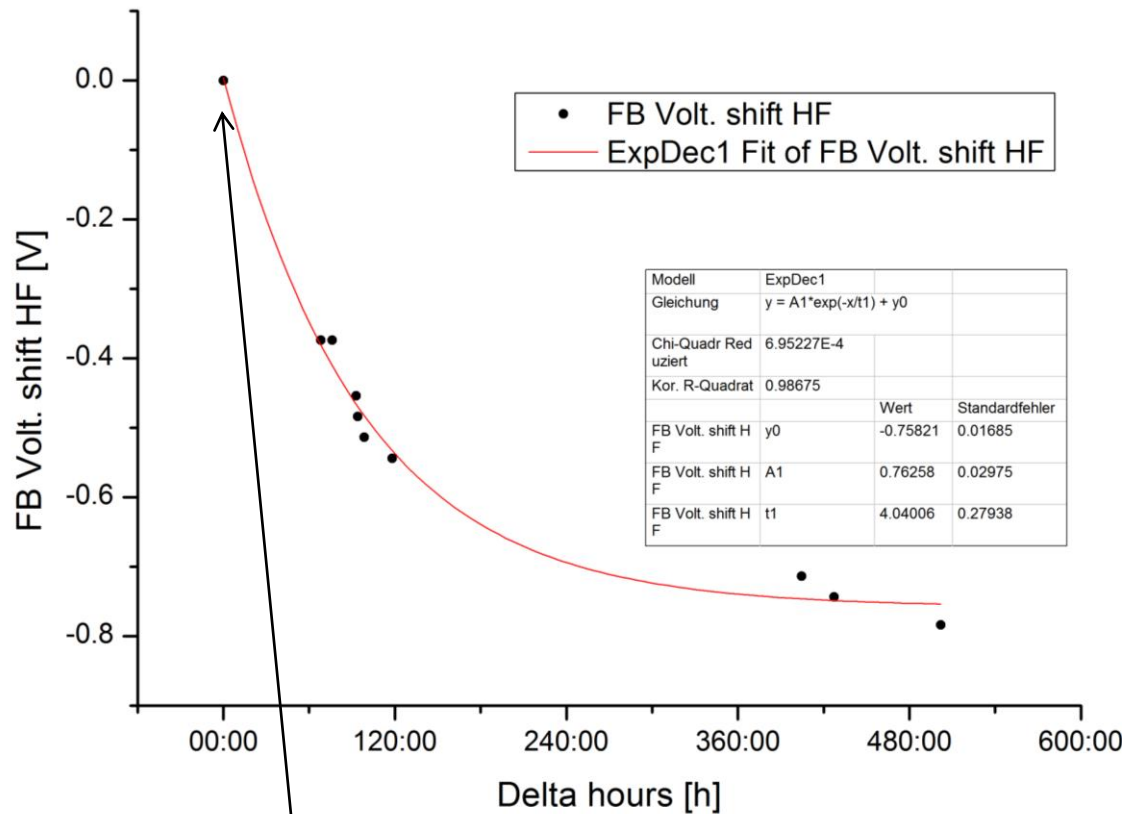
- Irradiate MOS diode up to 10 Mrad
- Evaluate flat band voltage shift
- Compare results with data of Q. Wei

## Conclusions:

- Corrected data from Q. Wei corresponds well with new dosimetry
- Fit model seems to agree fine, but has yet to be evaluated



# MOS diodes: Annealing of flat band voltage shift



Annealing is still under investigation, but so far, the threshold voltage shift is in good shape

To be done:  
Evaluate interface traps and annealing of them

Flat band voltage value at 10 Mrad is set to „0“