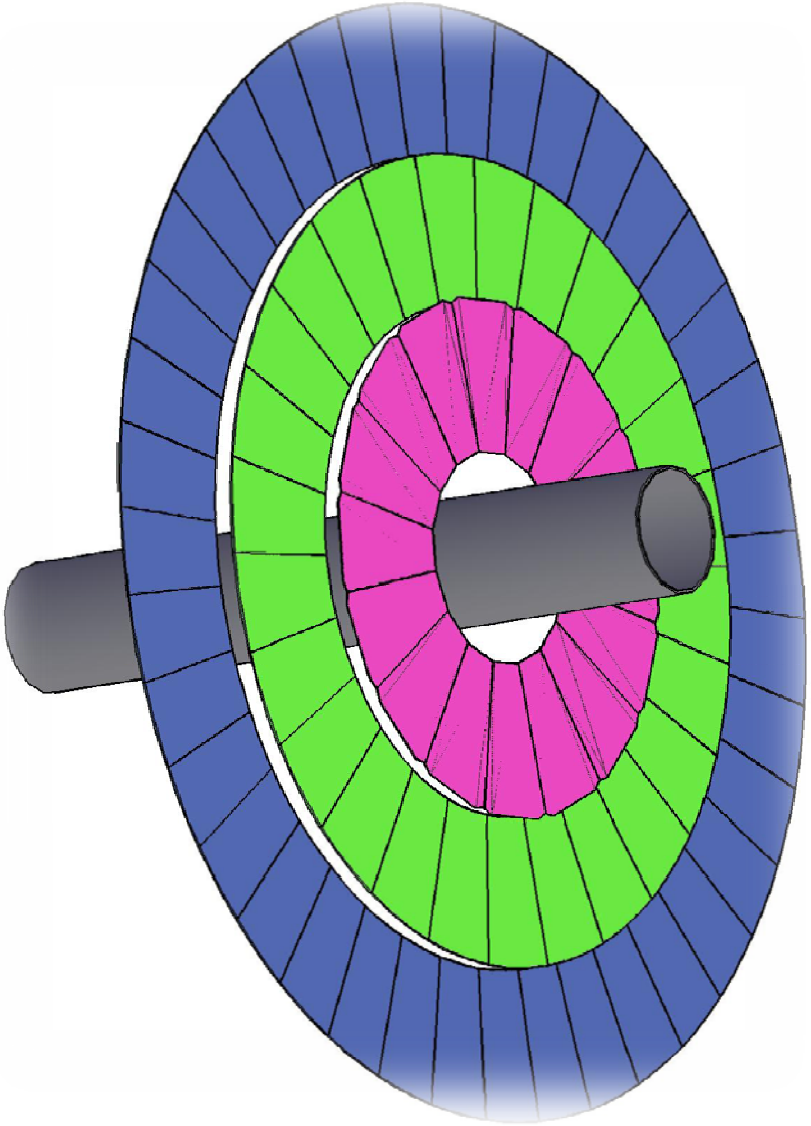
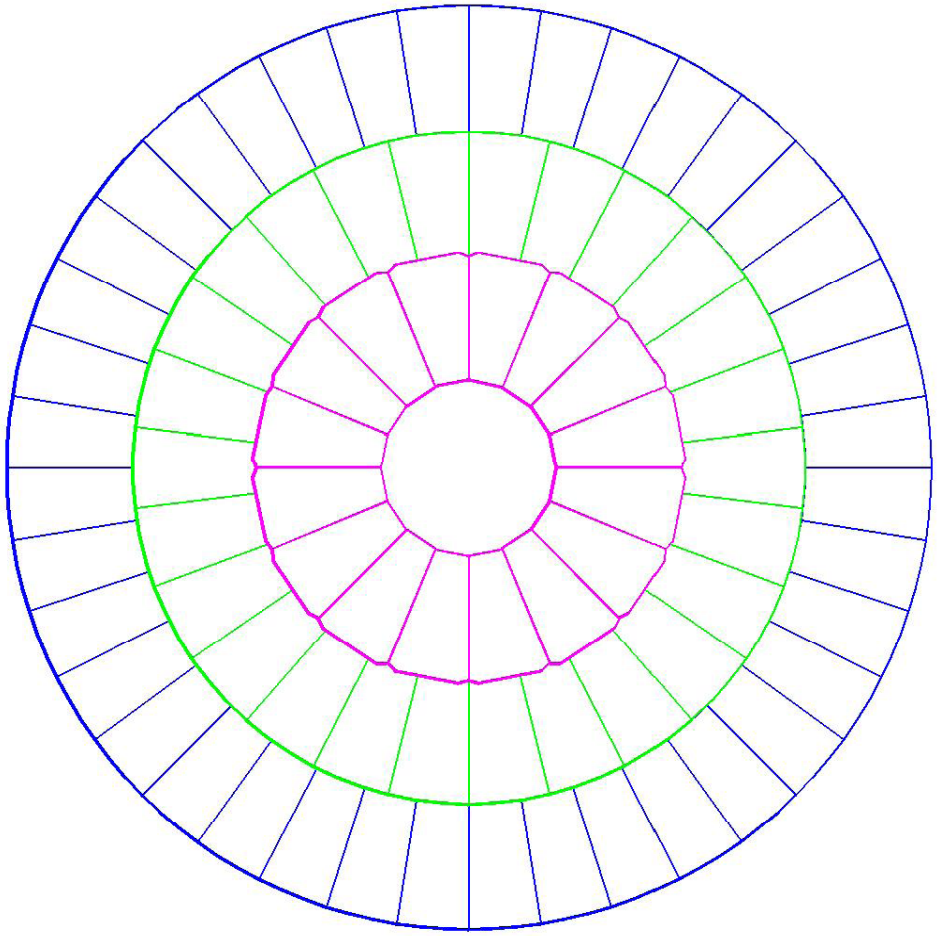
BSC upgrade

Structure

- Introduction
- Possible upgrade
- GaAs sensors and systematic studies
- GaAs irradiation tests
- Conclusions

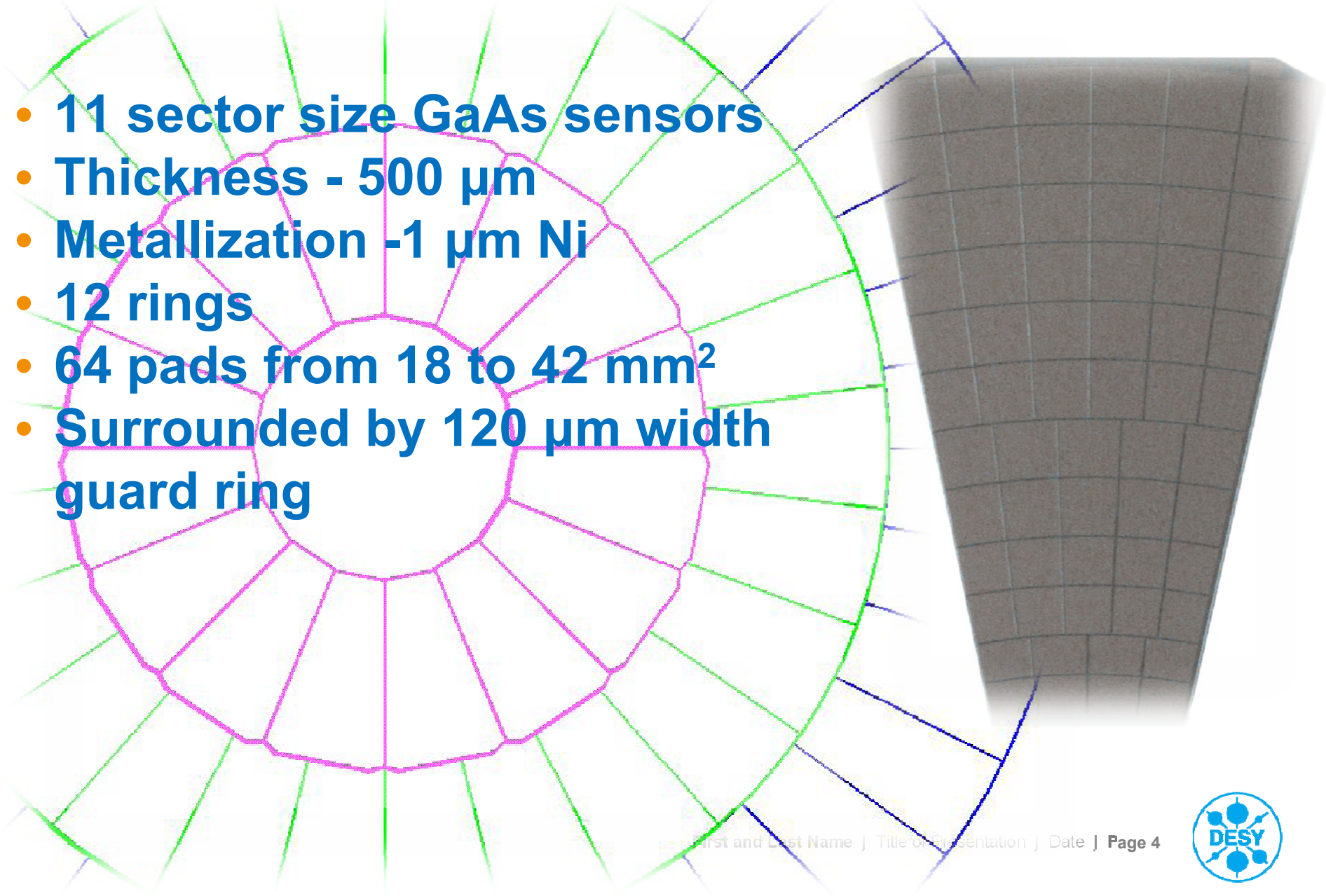
BSC upgrade



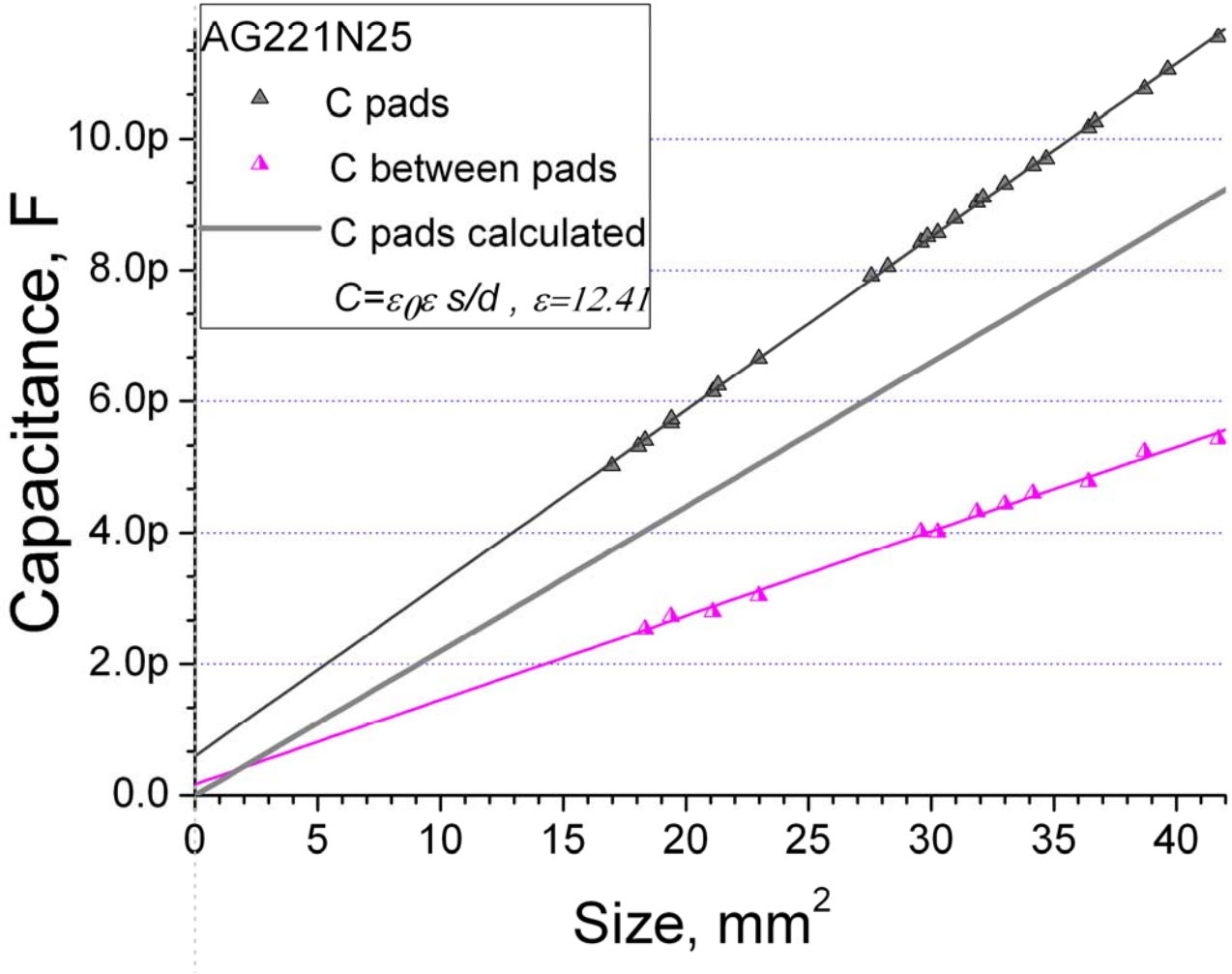


GaAs:Cr Sensor Plane

- 11 sector size GaAs sensors
- Thickness - 500 µm
- Metallization -1 µm Ni
- 12 rings
- 64 pads from 18 to 42 mm^2
- Surrounded by 120 µm width guard ring

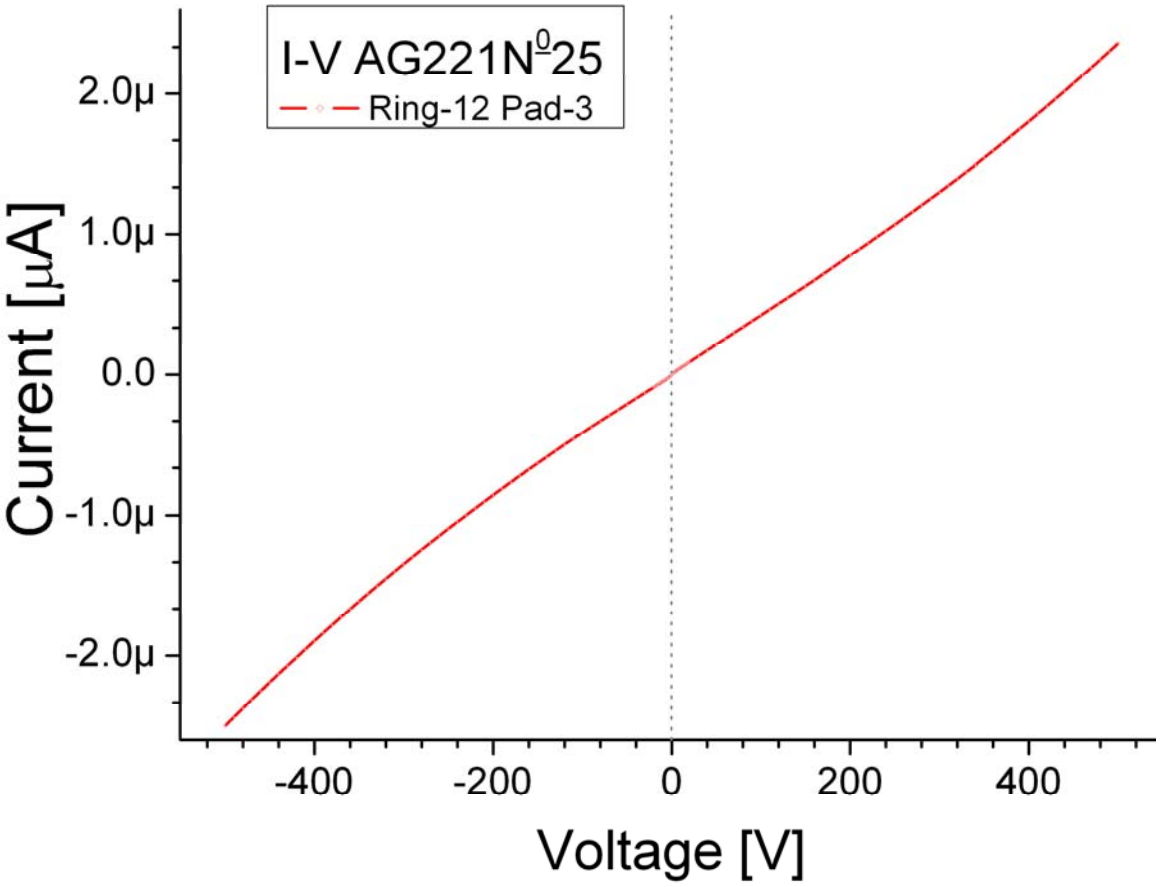


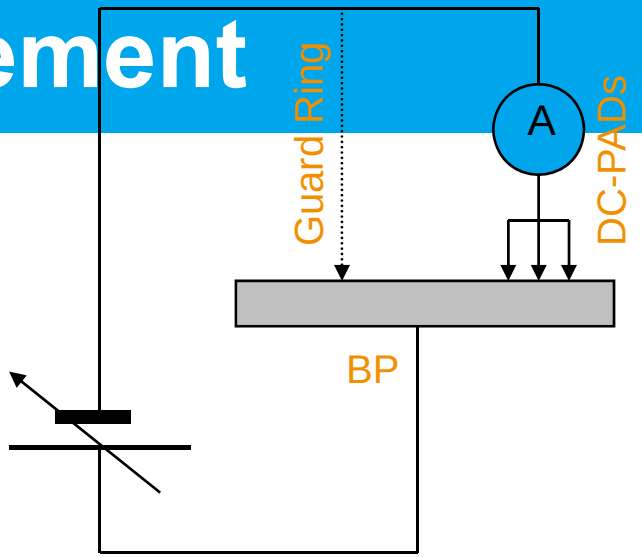
Capacitance measurements on 10 kHz

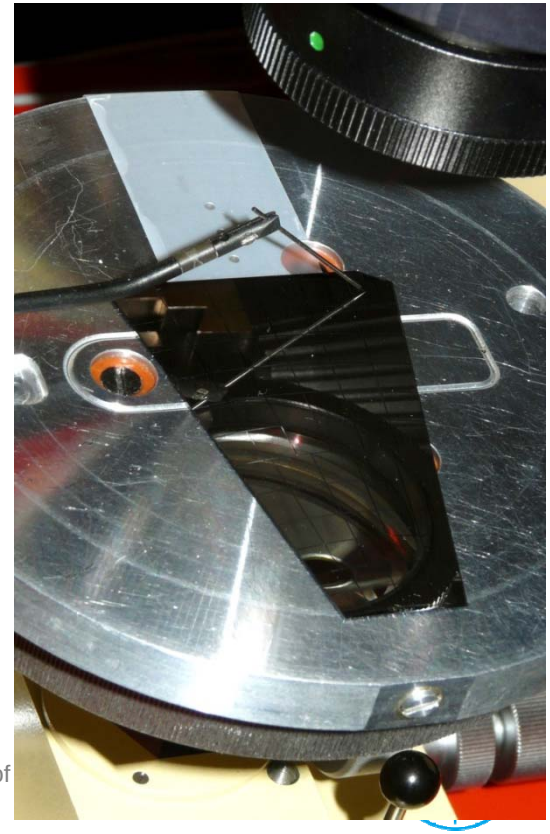


- Measurement shows shift in capacitance around S→0
- Sum of two parallel capacitors doubles
- Linearly dependence on pad size
- Predicted capacitance is smaller than measured, backplane is bigger then pad itself

Circuit for I/V pad measurement





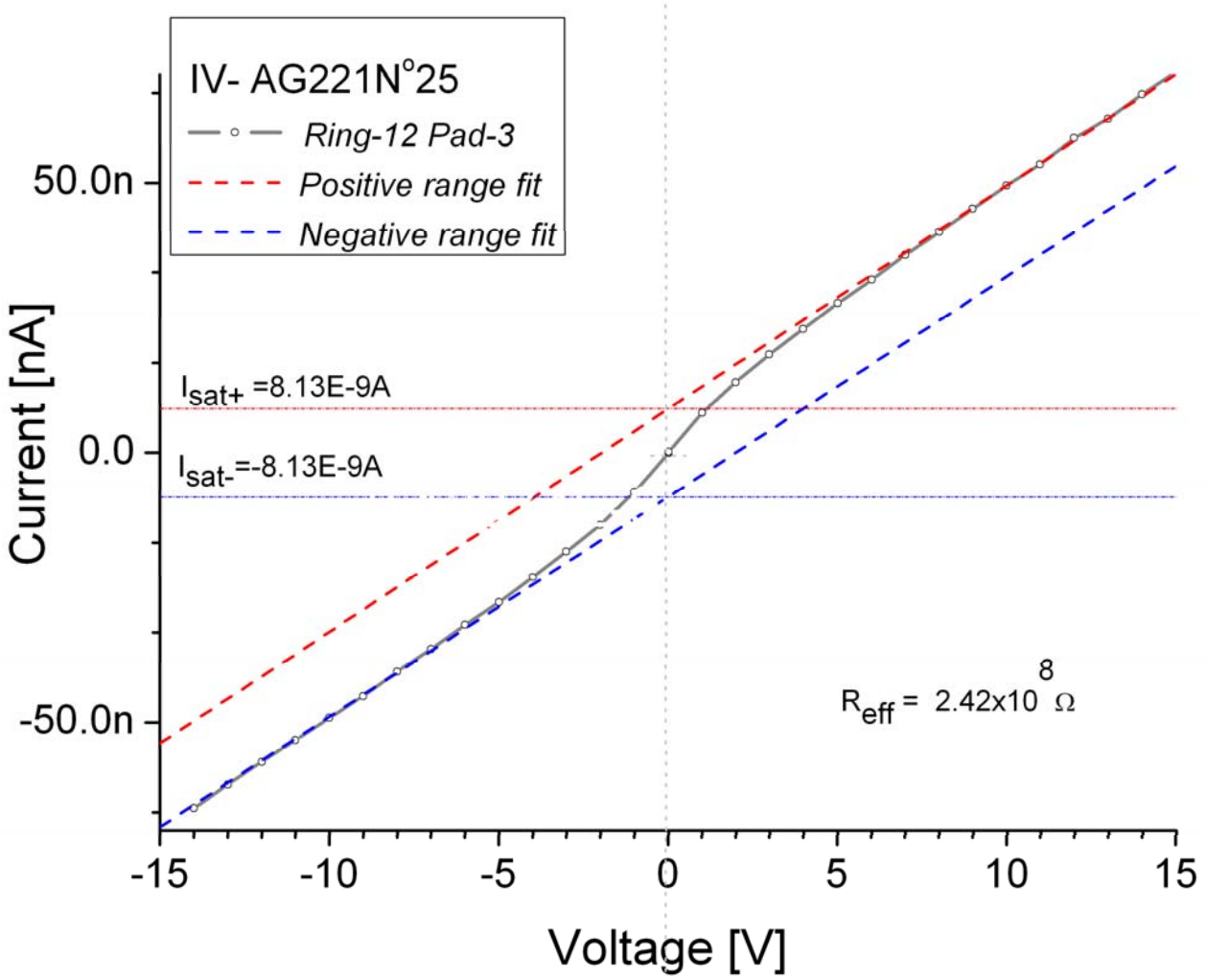


Typical IV measurement for single pad is symmetric and linear in the range +/-500V

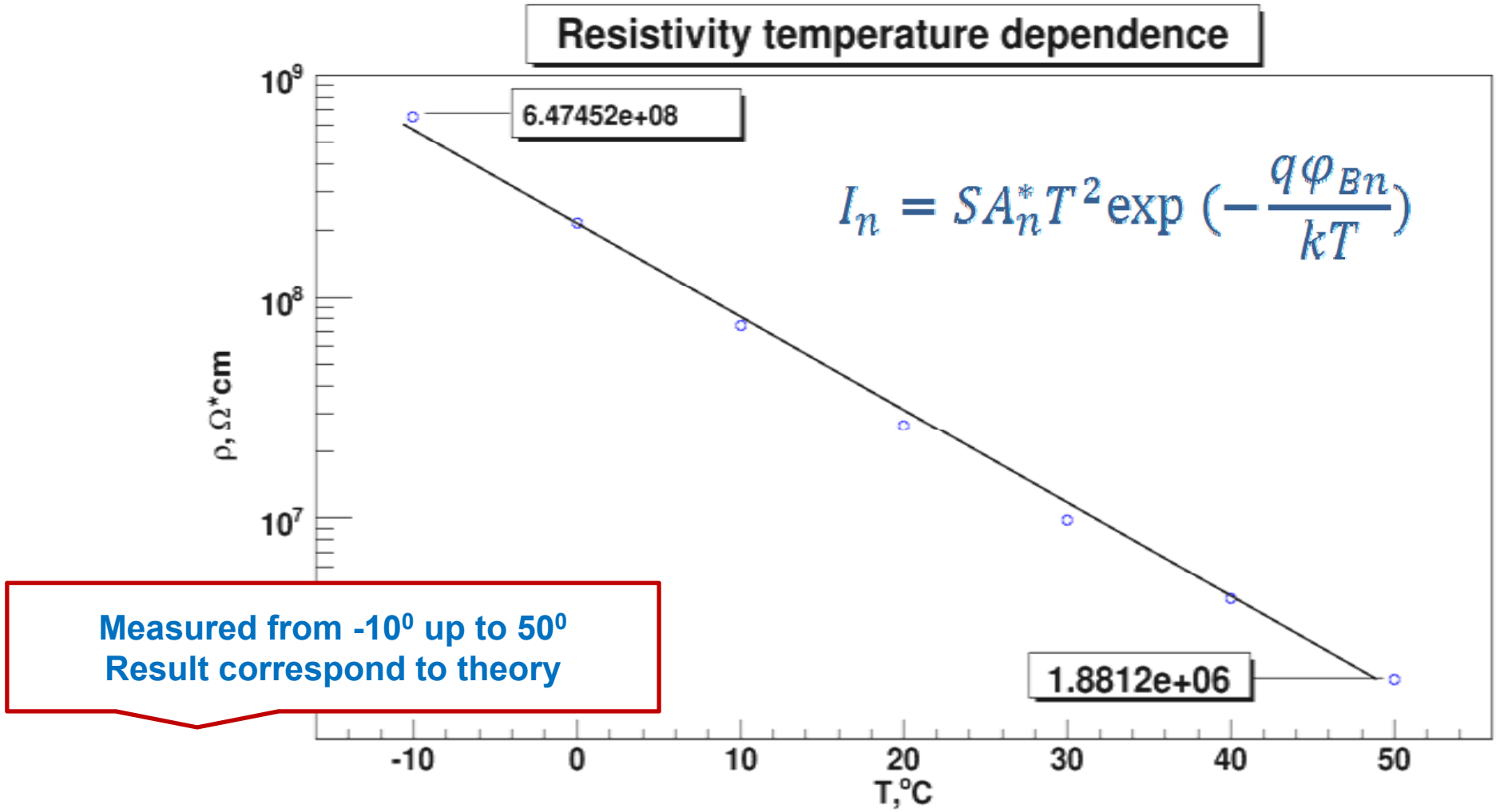
I-V in range +/-10V

Parameterization of the IV curve by 4 parameters:

- **Isaturation-**
- **Isaturation+**
- **Resestivity-**
- **Resestivity+**

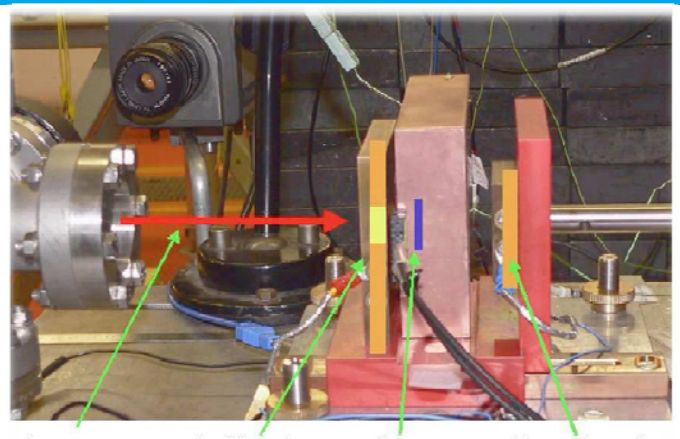


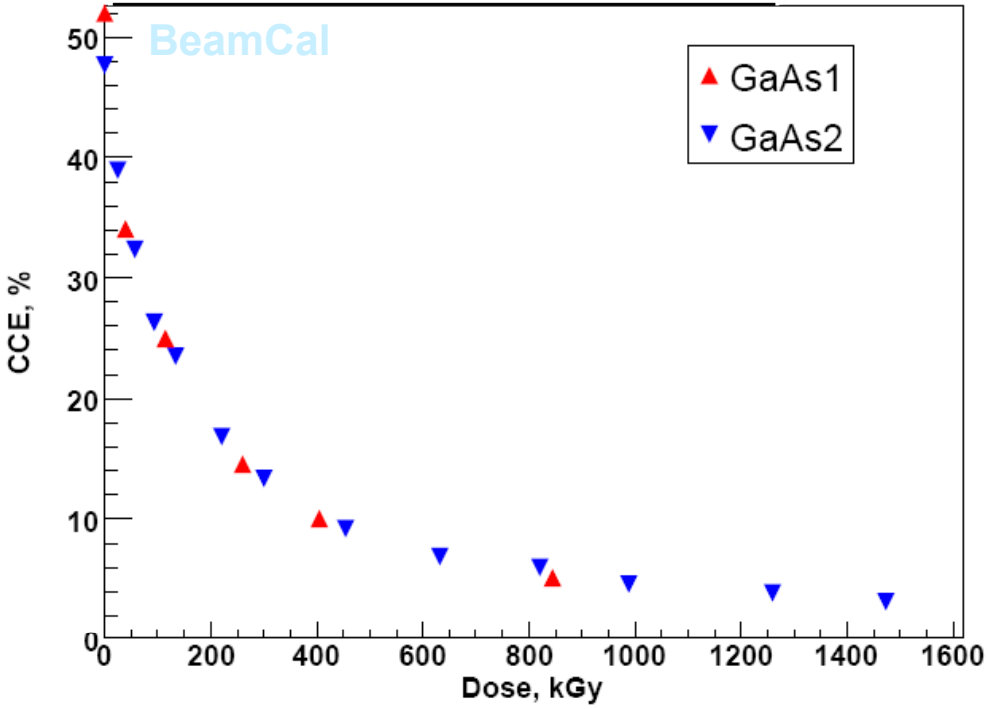
Temperature dependence of the resistance



Measured from -10⁰ up to 50⁰
Result correspond to theory

Radiation hardness





- Test beam in Darmstadt, S-DALINAC with an electron beam of up to 50 nA
- irradiation with doses of up to 1.5MGy
- Leakage current increased in factor of two at room temperature
- MIP signals separation was observed up to 600 kGy
- Similar GaAs:Cr sensors were tested up to 2×10^{14} p/cm^2, 4×10^{14} n/cm^2 (inside RD8 Collaboration)

Conclusions