

INVESTIGATION OF A SINGLE CRYSTAL DIAMOND SENSOR AND ITS APPLICATION IN BACKGROUND MEASUREMENTS FOR HERA

Wolfgang Lange, DESY Zeuthen



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OUTLINE OF THIS TALK

1. Motivation
2. The Sensor
3. Measurements
 1. Static Measurements
 2. Particle Detection (Source)
 3. Charge Collection during Irradiation
4. Results
5. Outlook



MOTIVATION

- Investigation of one of the first available single crystal diamond sensors
- Not only measurement of properties but also practical use in an application to achieve experience
- Extend this application into environments with radiation load later

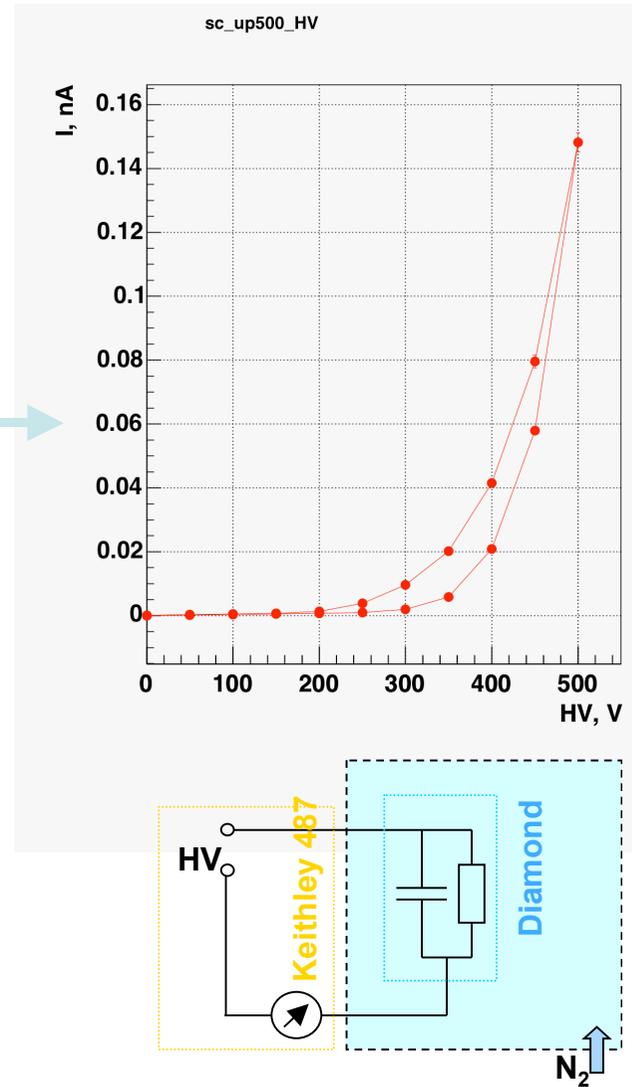
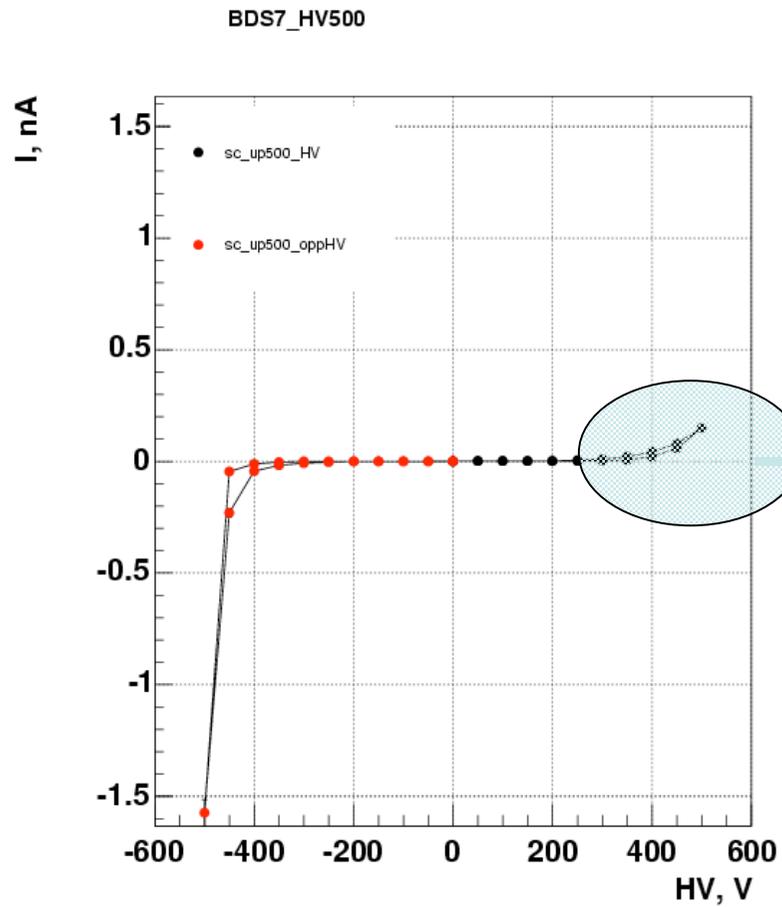


SENSOR

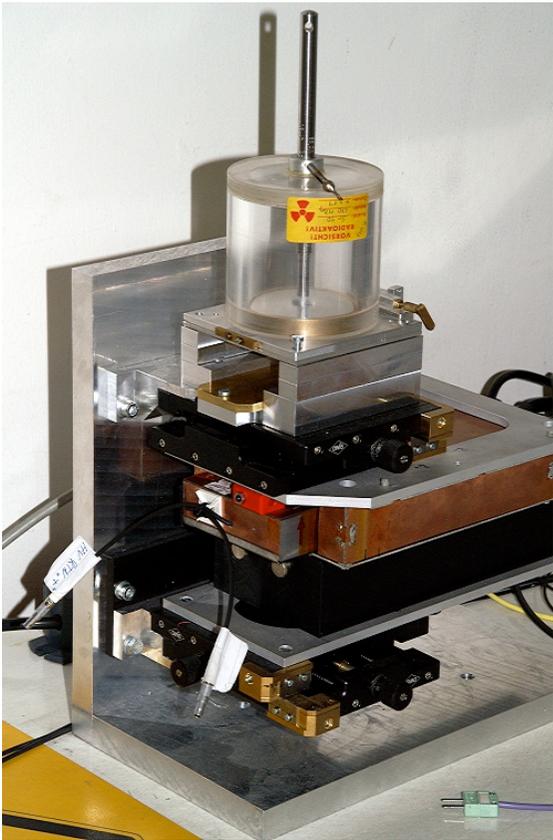
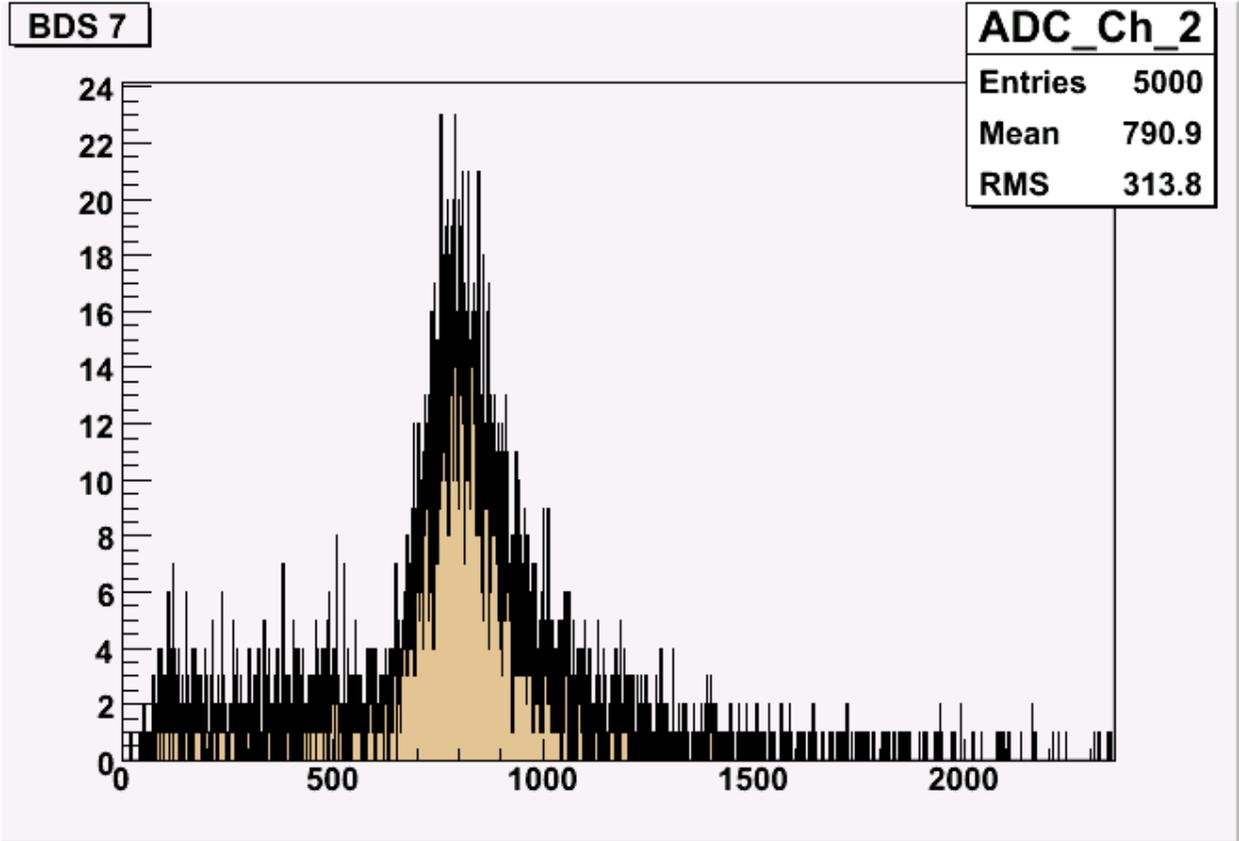
- Single Crystal (CVD grown on substrate) by E6
- About 5 by 5 square millimeters
- Metallization 3 mm in diameter
- Thickness 320 μm
- Connected via ultrasonic Al bonding



MEASUREMENTS (1)

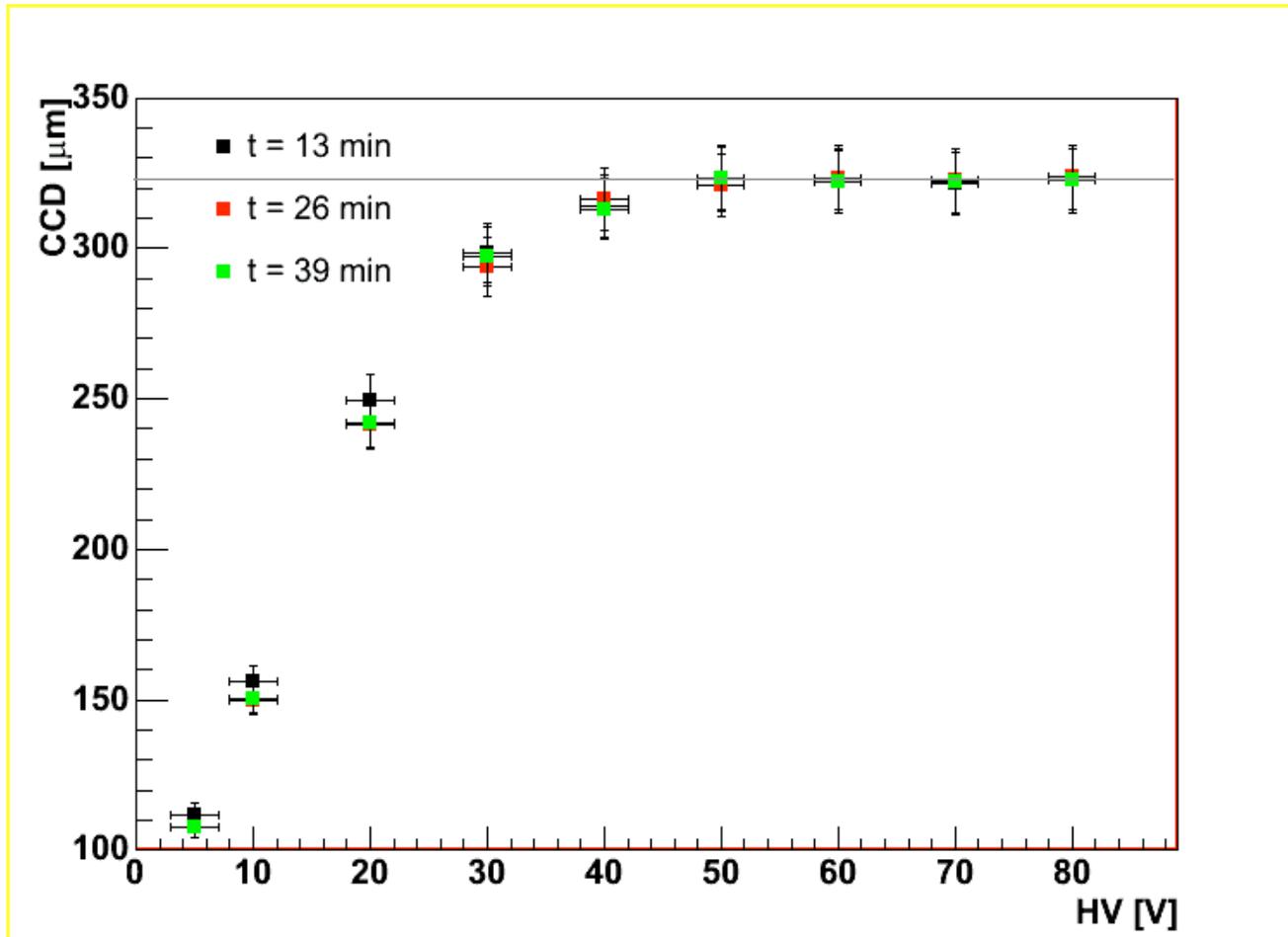


MEASUREMENTS (2)



MEASUREMENTS (3)

Charge Collection Distance:

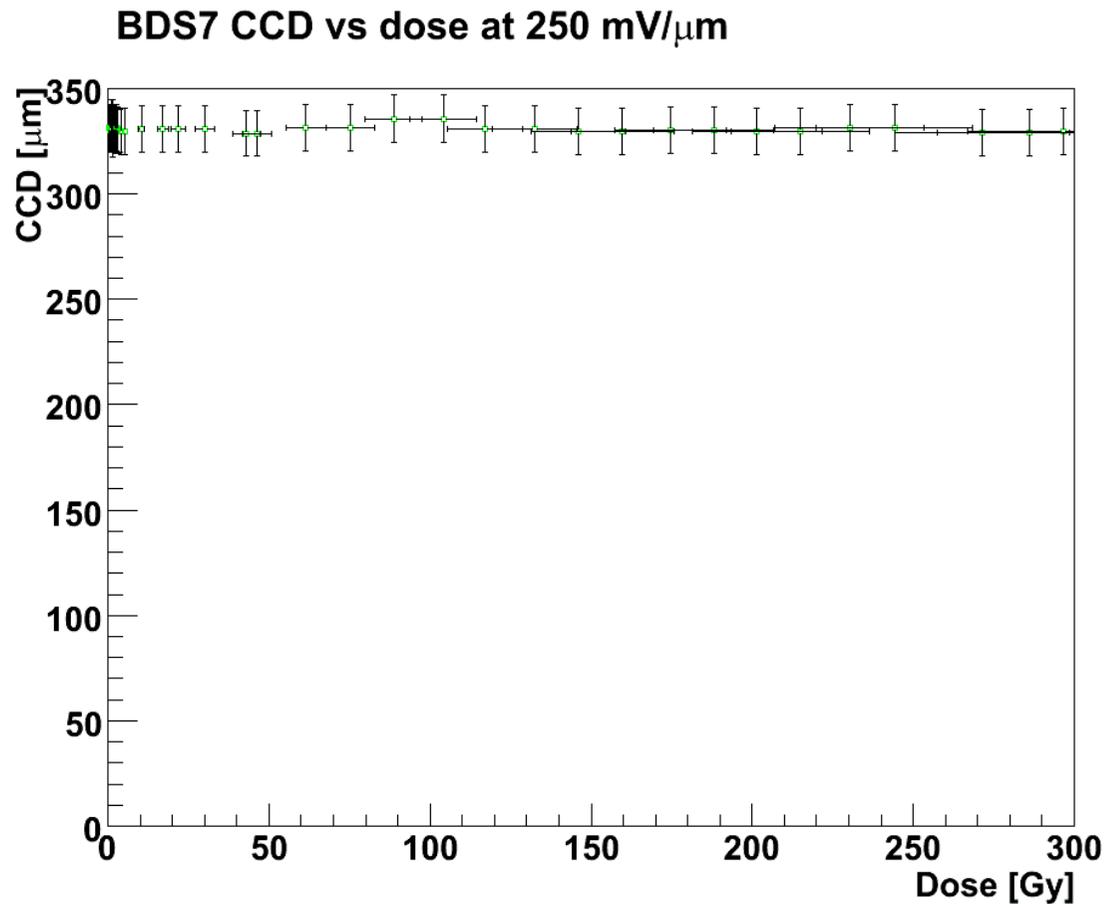


CCD reaches maximum @ 50V (100% efficiency, thickness = 320 μm)



MEASUREMENTS (4)

Charge Collection Distance:



CCD @ 80V
(100% efficiency,
thickness = 320 μm),
measured
for low doses (Sr90)



RESULTS

- 100% charge collection efficiency, CCD = thickness
- Stable for low doses
- Clearly separated spectrum of minimal ionizing particles
- 1 mip results in 11.5 ke^- (1.84 fC)



OUTLOOK

- application of this sensor in particle counting:
 - use of a preamplifier, put it in a box, interface electronics
 - appointed application: radiation monitor (HERA, Zeus)

