

# NNP

Non Neutral Plasma  
Physics Group



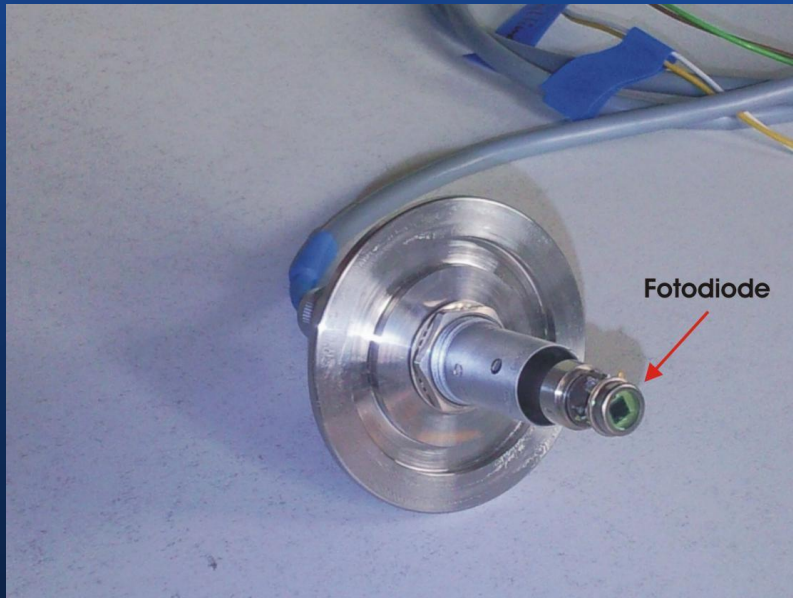
# Non-Destructive Beam Diagnostics in Strong Magnetic Fields

HICforFAIR Workshop  
7. March 2011  
Adem Ates

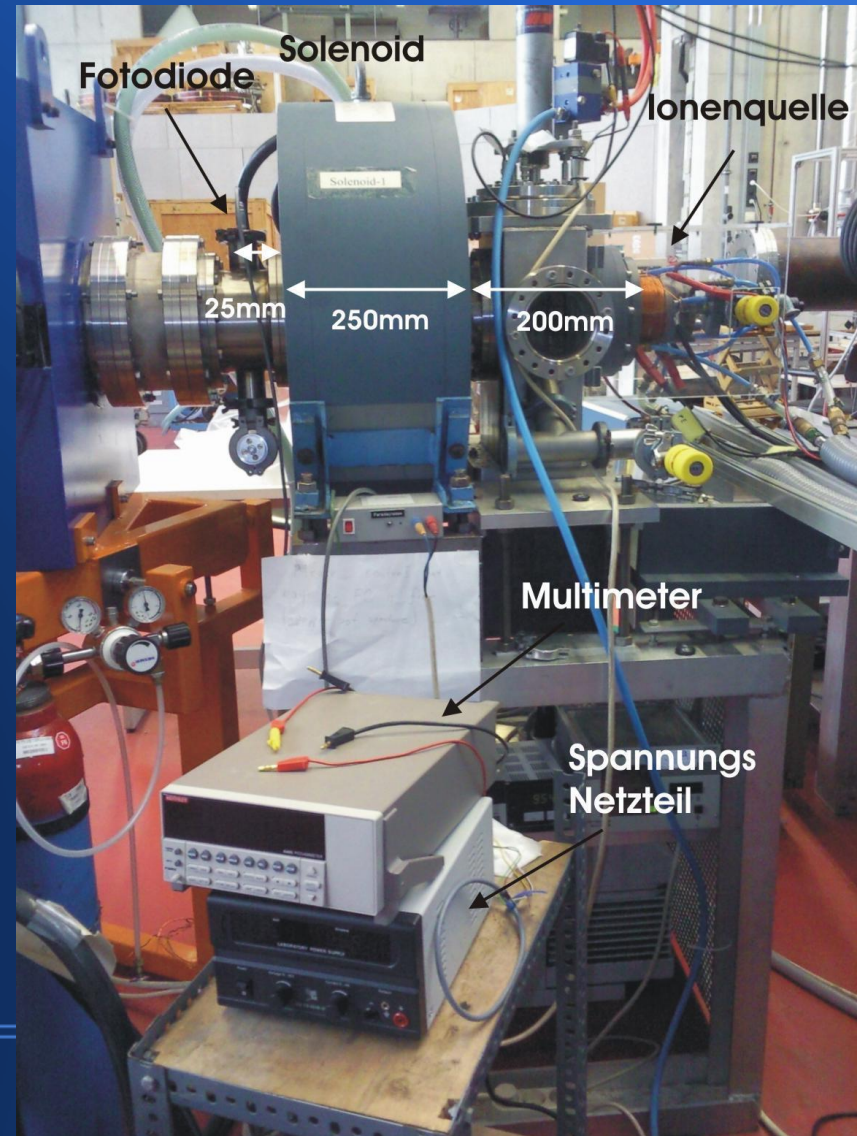
# Content

- Results of the measurement with **one photodiode**
- Several measurements with the **non-destructive Methods**
- Comparison to **Simulation**
- Outlook

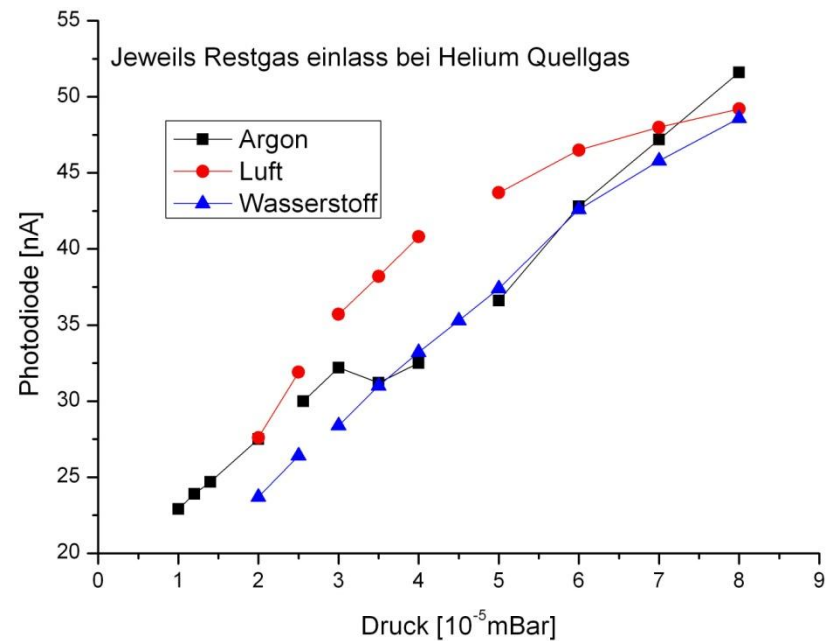
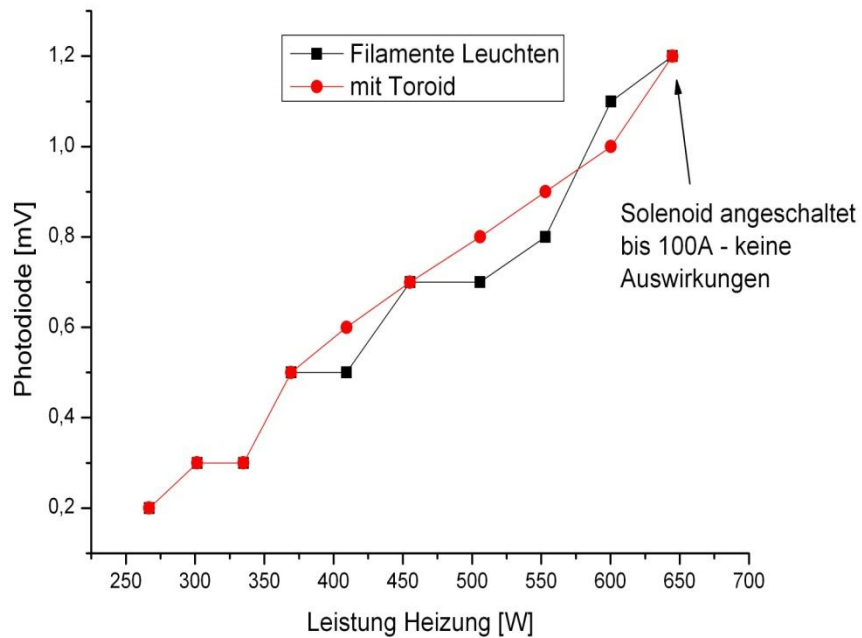
# Testing **one** Photodiode in the experimental setup



Preparative Operations



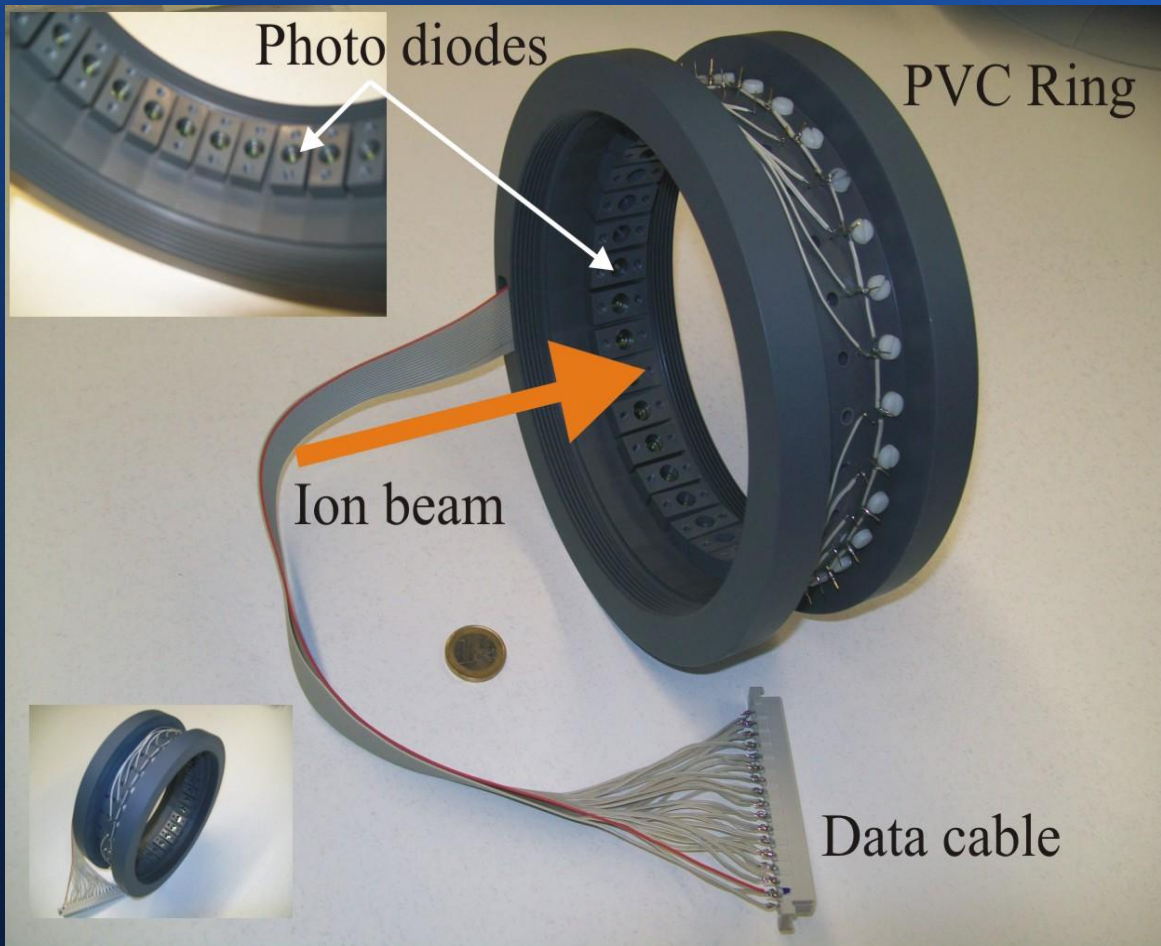
# Measurements with **Magnetic field** and Residual Gas



Testing the influence of the B-Field of **0.6T** on the photodiode – **Ion source filament**

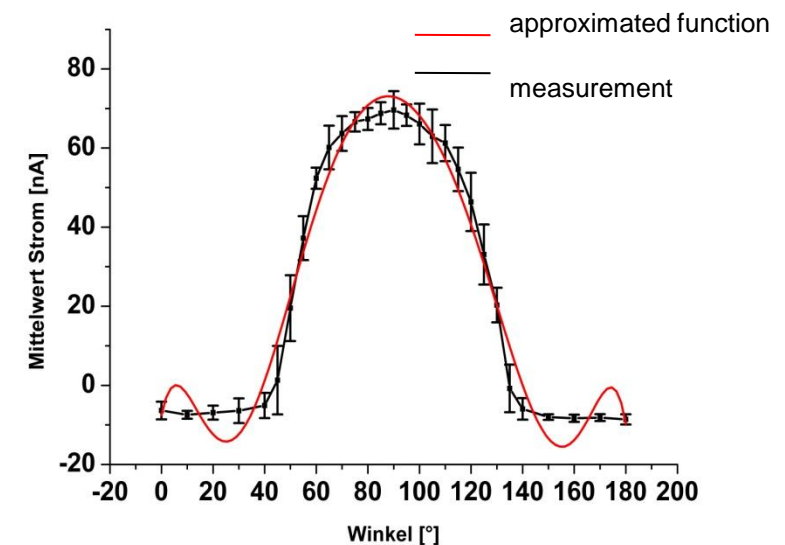
Detection of the **residual gas** with the photodiode

# Photodiodes arranged in a circle



- **32** Photodiodes
- 200 mm diameter
- Hole Ring made of PVC **no metallic material** except the photodiode itself

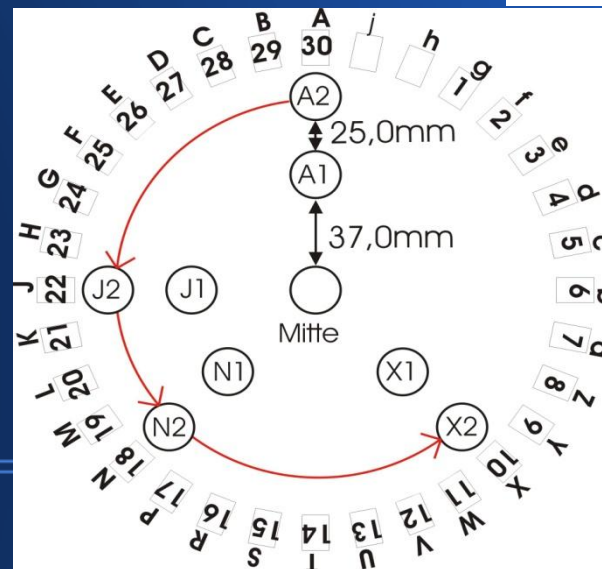
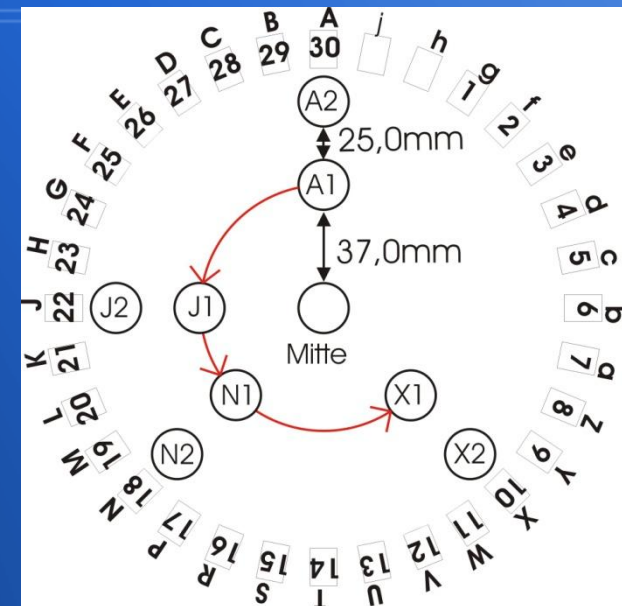
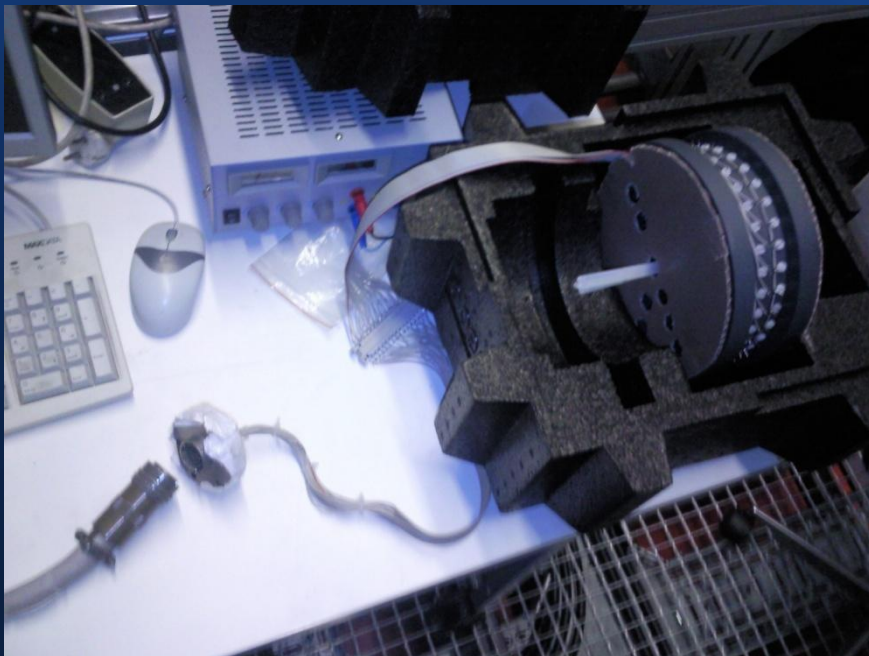
**Angle acceptance** of one Photodiode segment



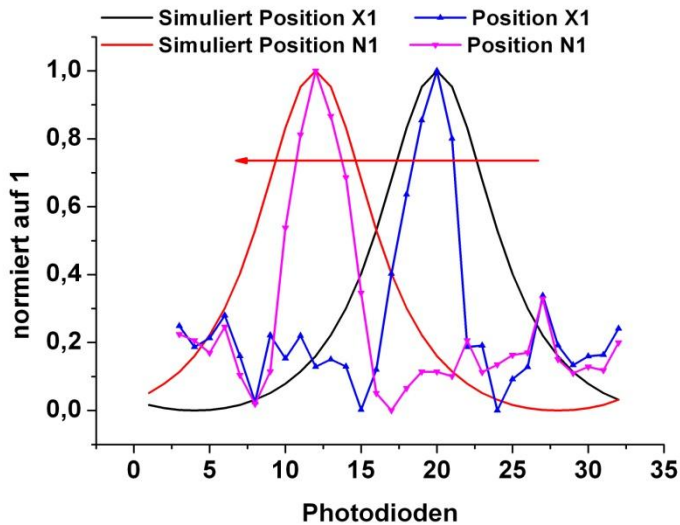
# Calibration of the arranged photodiodes

Using a glow stick as homogeneous light source

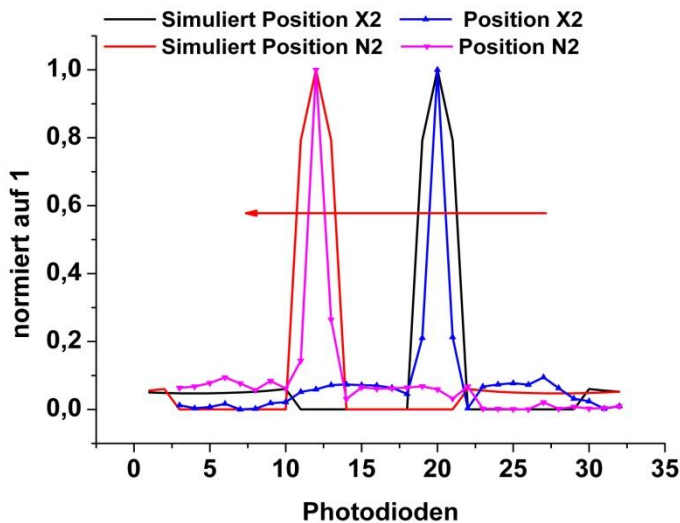
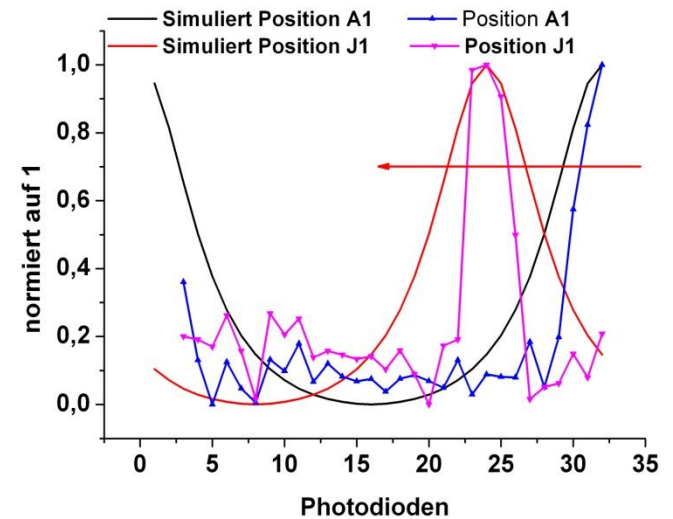
**Azimuthal** and **radial** motion of the light source



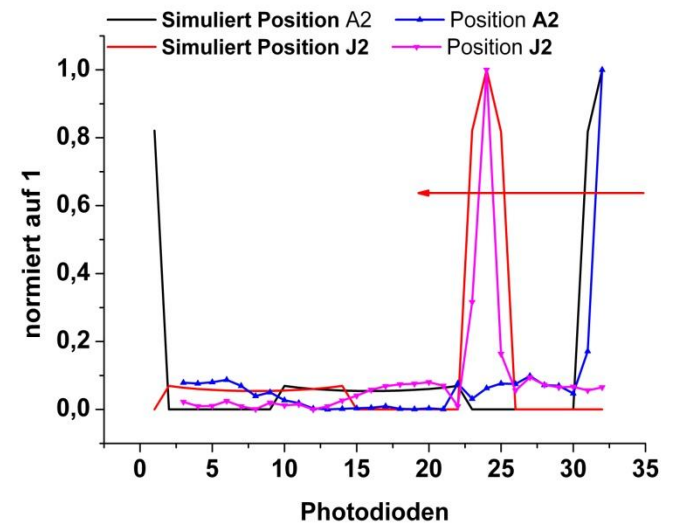
# Detection of radial and azimuthal motion of the Glow stick and Comparison to Simulations



**Position changes at azimuthal motion**

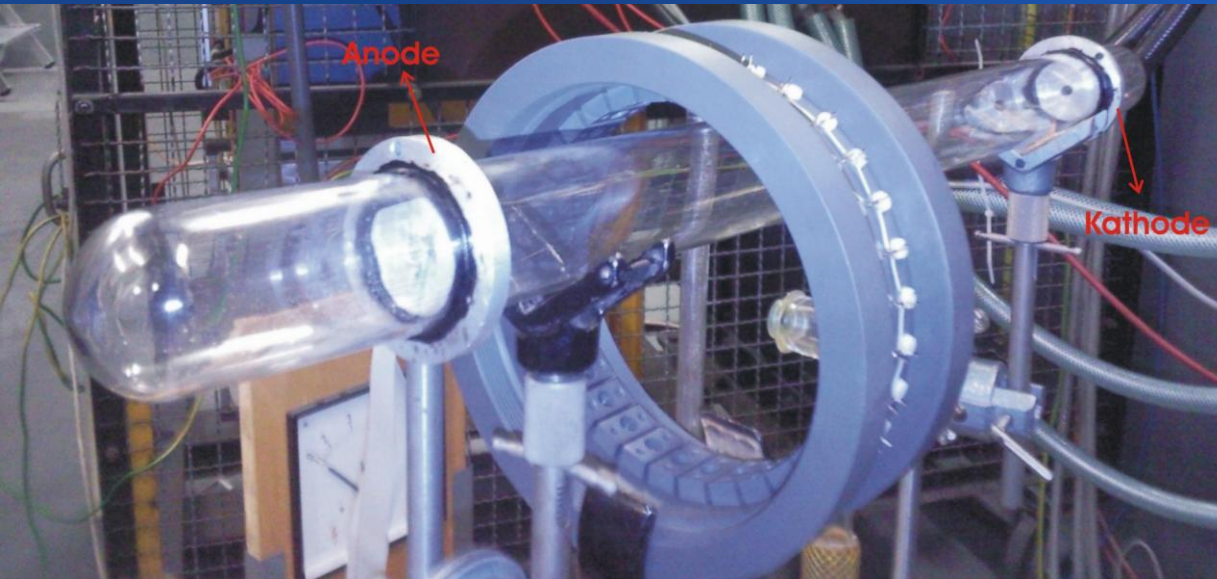


**Only a few photodiodes give a signal at radial motion**



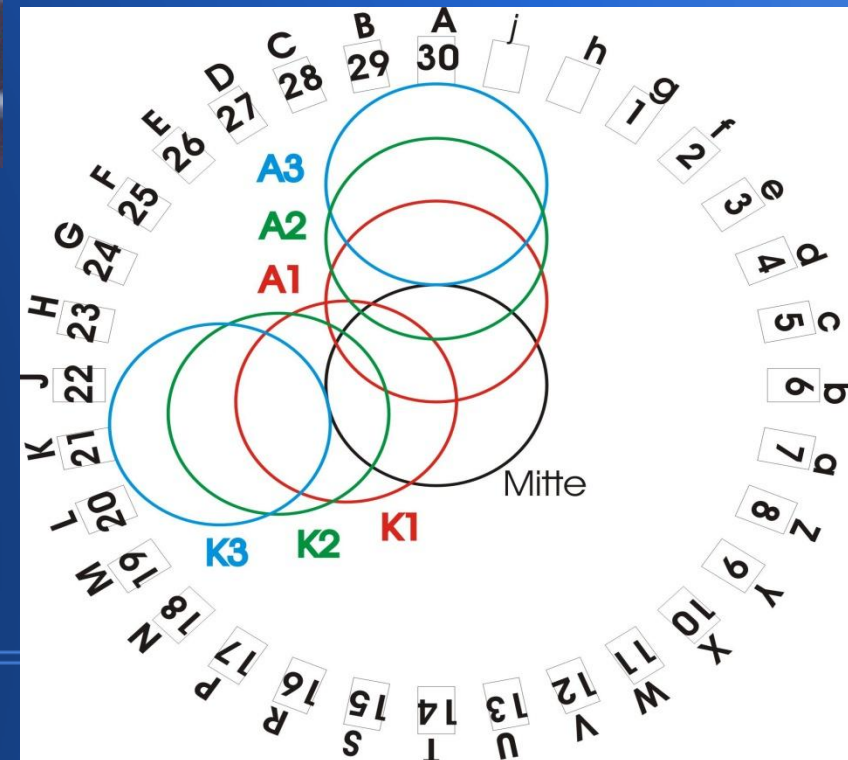
# Calibration of the arranged Photodiodes

Using the Geissler tube for a beam type Light source



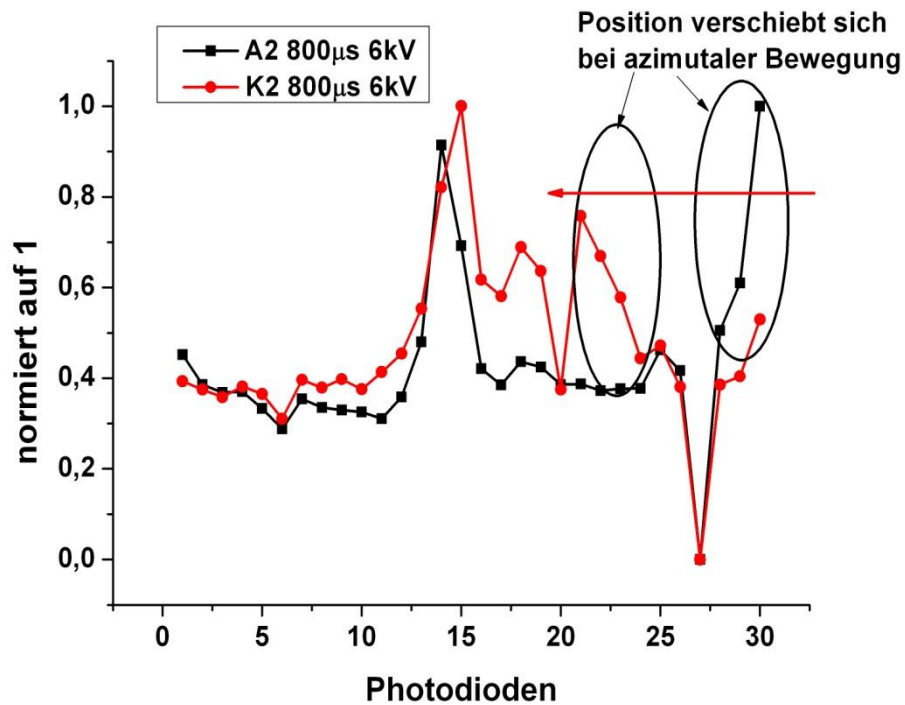
Geissler tube operated at 6kV and  $3E-1$  mbar

Azimuthal and radial motion of the light source

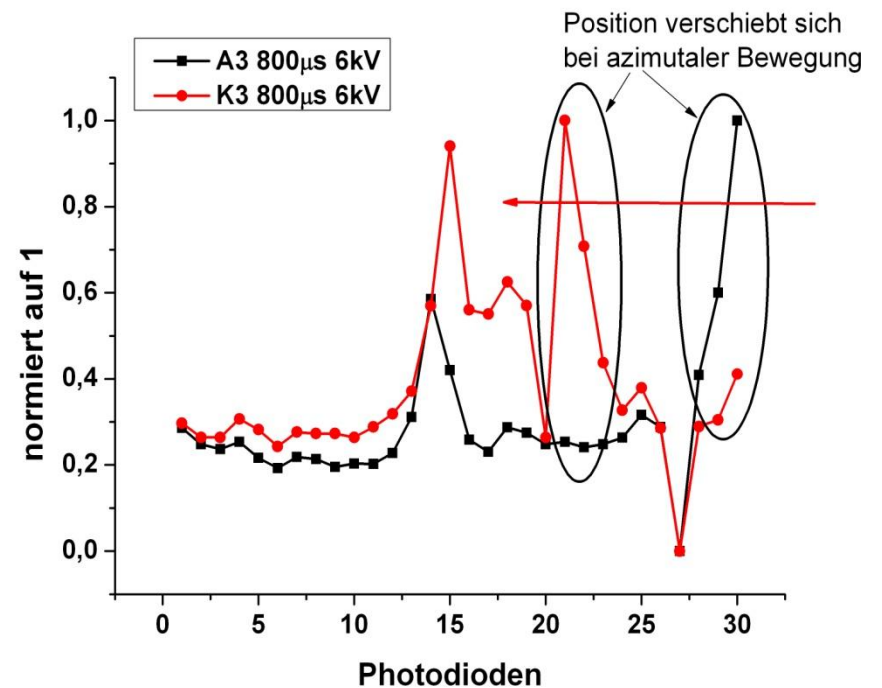




# Detection of radial and azimuthal motion of the Geissler tube



**Position changes** at azimuthal motion and **less** photodiodes give a signal at radial motion



# Outlook

- Next step is to detect the **ion beam in vacuum**
- Simulations show us that we need **more photodiodes** and **smaller angle acceptance** for higher resolution
- Need of self made **data acquisition system** for optimum calibration and flexibility

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Thanks for your attention