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# **Investigation of the measured signal of protons in pixelated semiconductor detectors**

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Felix Gläsemann

TU Dortmund, Department of Physics - AG Kröninger

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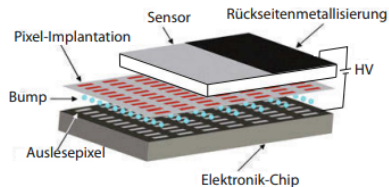


## About me

- Name: Felix Gläsemann
- Age: 27
- Intended degree: Bachelor in medical physics
- Hobbies:
  - Running, swimming
  - Reading
  - Going out with friends

## Motivation for the bachelor thesis

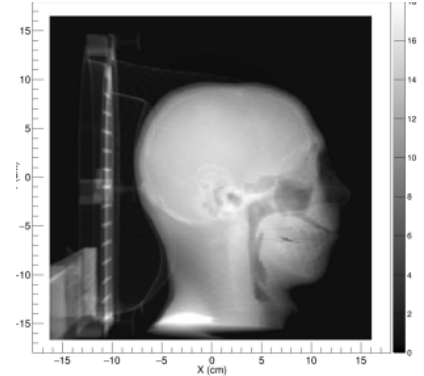
- Physical and medical application
  - Improving diagnostics through **proton imaging**
  - Better understanding of proton detection in the low-energy range ( $< 150$  MeV)
  - Influence of clustering in pixelated silicon detectors
- Comparison between experiment and simulation



Schematic structure of a pixelated silicon detector [1, p. 334]

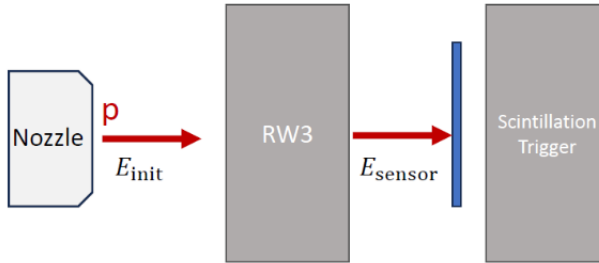
## Proton imaging

- Proton beams to create images of tissue
  - Protons interact with tissue
  - Signals from the interaction get detected
  - Images are reconstructed
- Advantages:
  - Improved soft tissue contrast
  - Reduced radiation dose
- Application in medical imaging and materials science



*Reconstructed proton radiograph (RPR) [2, p. 99]*

## Experimental setup



- RW3 phantom used to lower the energy of the protons
- FE-I4 used for detection

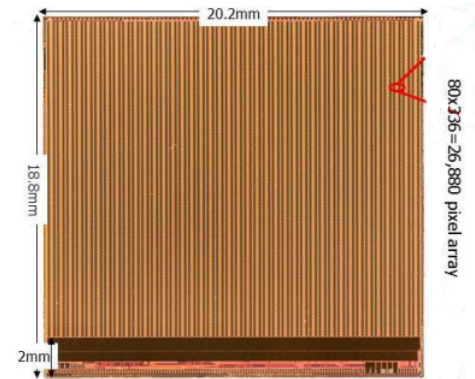
## Experimental setup

### ■ FE-I4

- Developed for ATLAS Experiment
- High-speed data readout
- Identify and process relevant data from particle collisions

### ■ RW3 phantom

- Variable measuring depth (0 to 300 mm)
- Made of water-equivalent RW3 material



FE-I4 module [3, p. 3]

## What's next?

- Building the experimental setup using Allpix Squared
- Start the simulation and get first results
  - Compare results from experiment and simulation



**Questions?**

## Literature

- [1] Hermann Kolanoski and Norbert Wermes. *Teilchendetektoren*. 2016.
- [2] Chelsea Miller et al. *Journal of Radiation Oncology*. 2019. URL:  
<https://doi.org/10.1007/s13566-019-00376-0>.
- [3] Marlon Barbero et al. *The FE-I4 Pixel Readout Chip and the IBL Module*. 2012. URL:  
<https://cds.cern.ch/record/1415701/files/ATL-UPGRADE-PROC-2012-001.pdf>.