HELMHOLTZ ZENTRUM
DRESDEN ROSSENDORF

5th NOVALIS Meeting @HZDR

Project Status: HZDR - Sebastian Klug

DRESDEN
concept

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Content

Recent PAS measurements at HZDR

- The role of point defects in NbTiN thin film deposited by DC/HiPIMS magnetron sputtering (**University of Siegen**)

- Magnetic flux-expulsion studies on and S-I-S / S-S Structures (**University of Hamburg & CERN**)

- Exploring the Role of Point Defects in NbTiN Thin Films for Enhanced SRF Cavity Performance (**University of Siegen**)

Helmholtz-Zentrum Dresden-Rossendorf (HZDR)

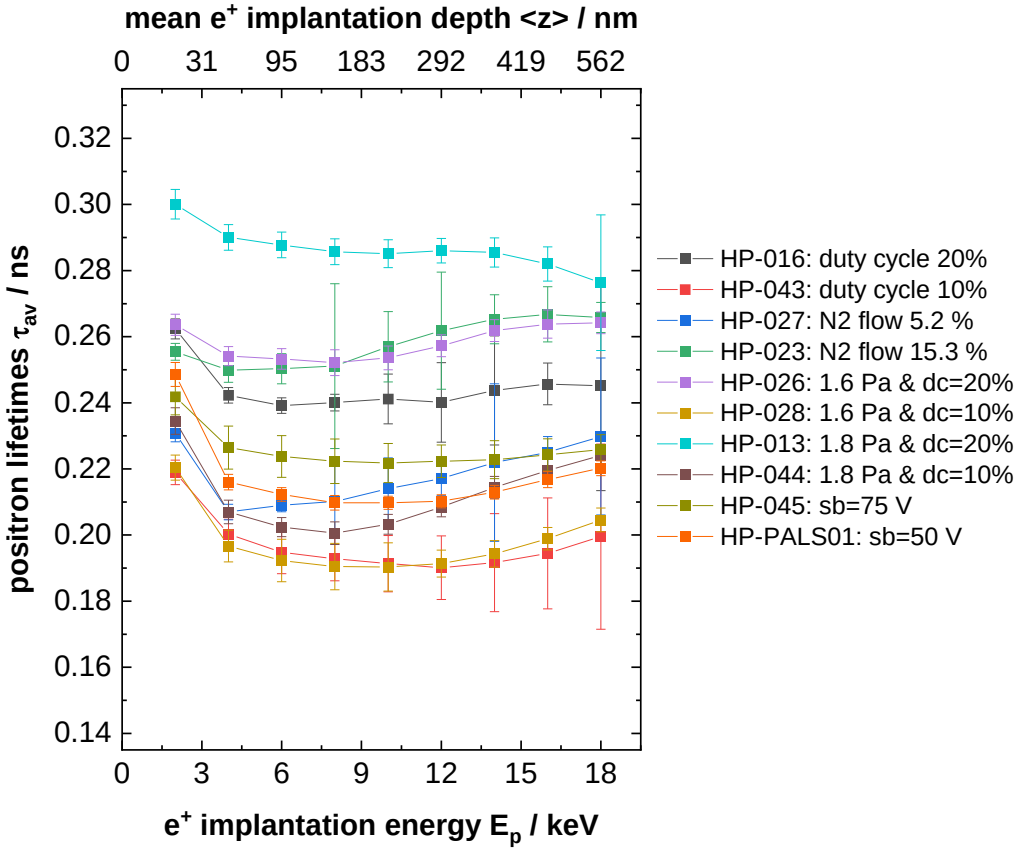
Status of my PhD project

The role of point defects in NbTiN thin film deposited by DC/HiPIMS magnetron sputtering

POS24203543 - Aleksandr Zubtsovskii & Bharath Reddy Lakki Reddy Venkata, 08/2024

- beamtime @MePS → PALS (τ_{av}; τ_i; I_i)
- measurement @SPONSOR → DBS (S parameter)
- **20 samples measured**, (variation of deposition parameters)

HiPIMS - NbTiN →



The role of point defects in NbTiN thin film deposited by DC/HiPIMS magnetron sputtering

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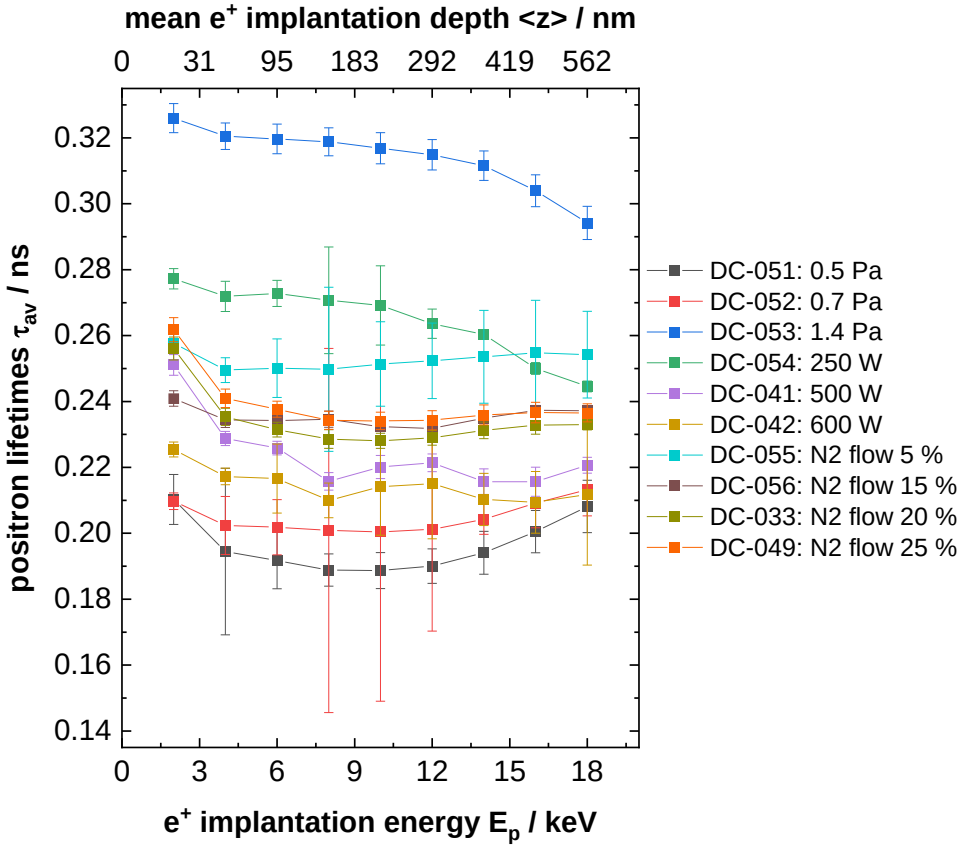
DC MS - NbTiN →



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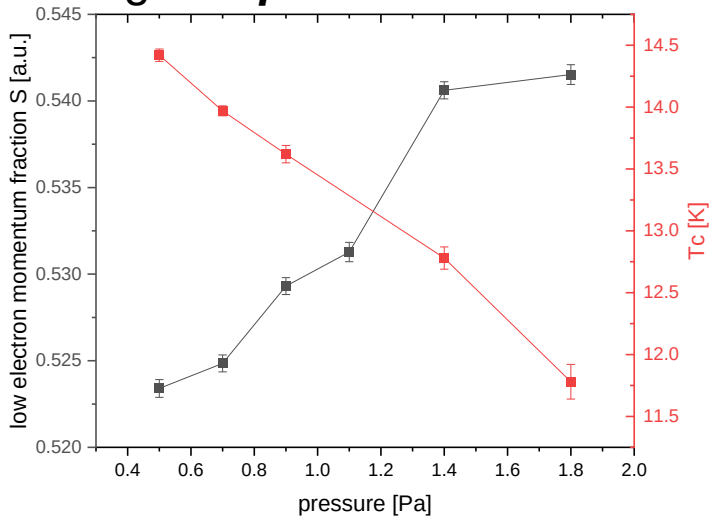
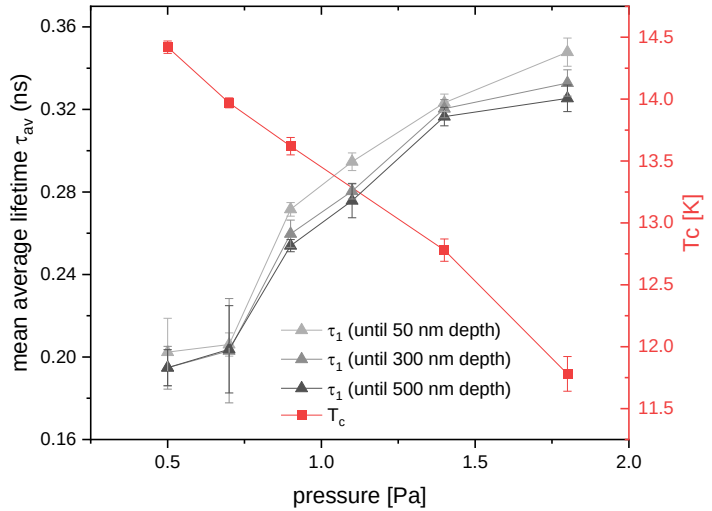
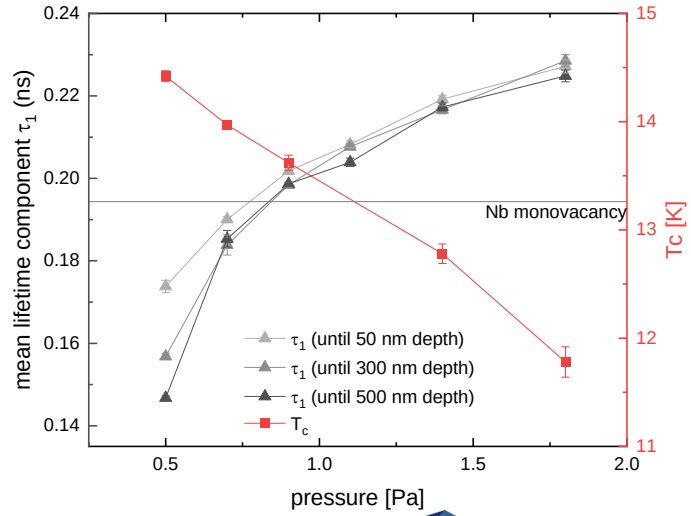
- **20 samples measured**, (variation of deposition parameters)
- **correlation of defects and T_c** **→ more data needed!**
  - e.g. ***DC pressure series:***







Magnetic flux-expulsion studies on and S-I-S / S-S Structures

POS24203546 - Marc Wenskat, 11/2024

- beamtime @MePS → PALS (τ_{av}; τ_i; I_i)

- **14 samples** measured, study of:
  - Cu / Nb
  - Nb annealing
  - Nb / NbTiN (SS structure)
  - Nb / AlN / NbTiN (SIS structure)

➢ discussion of data still pending

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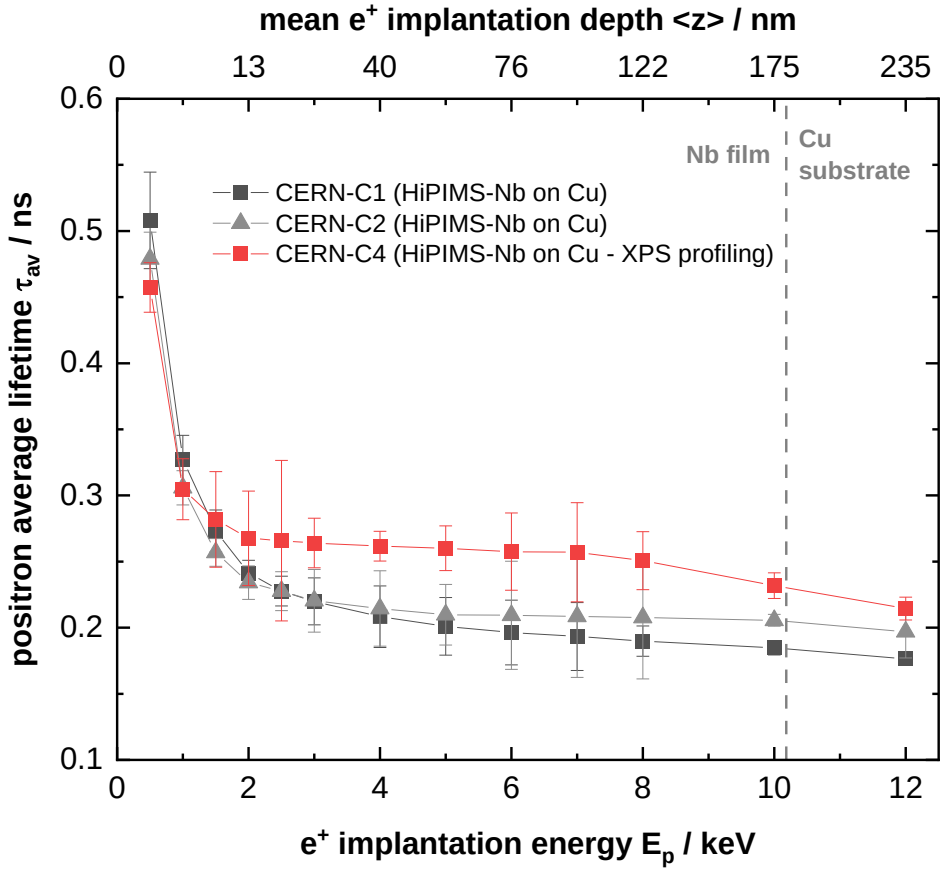

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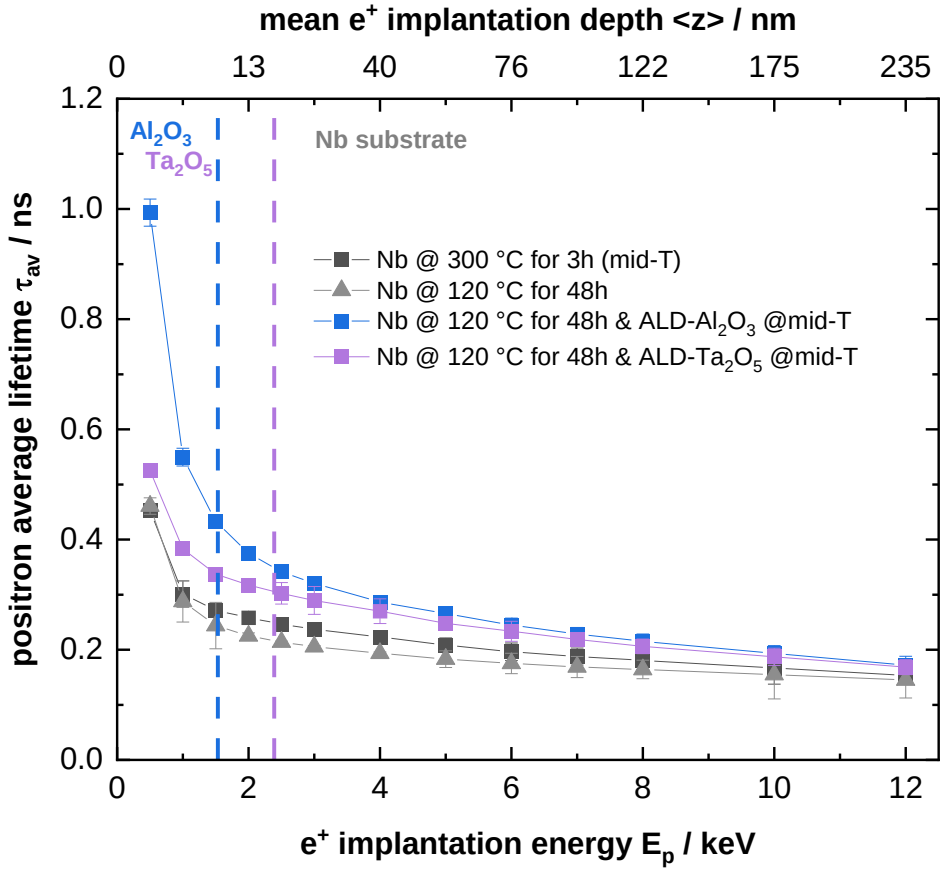

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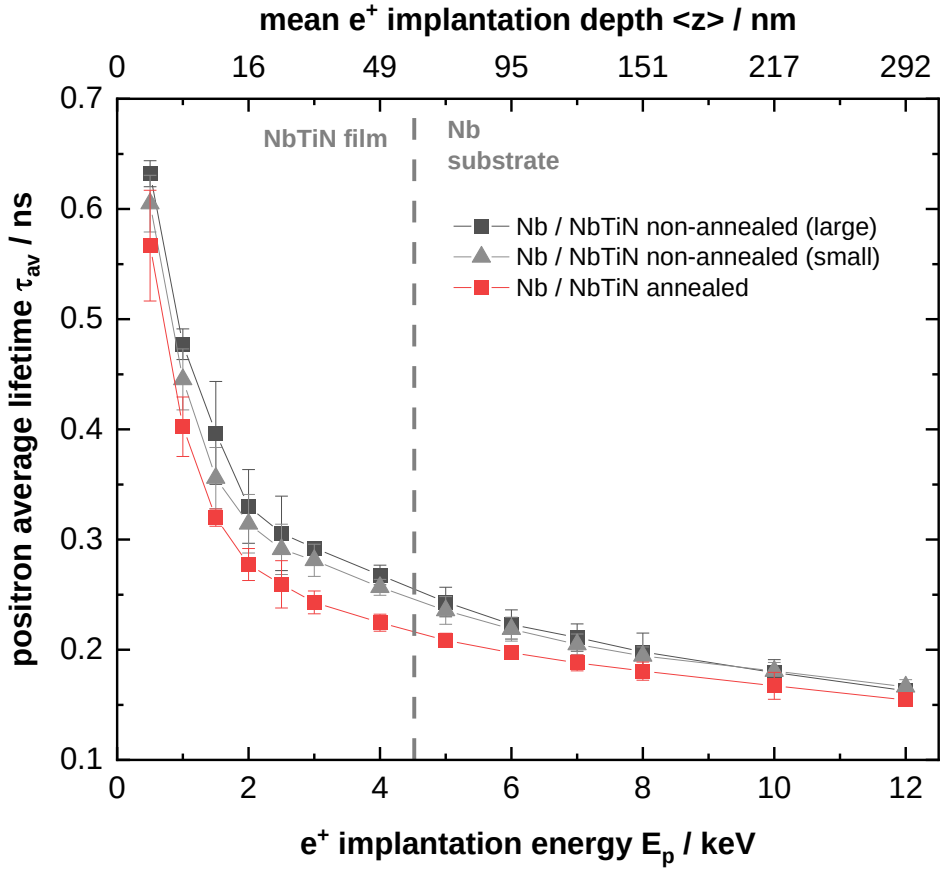

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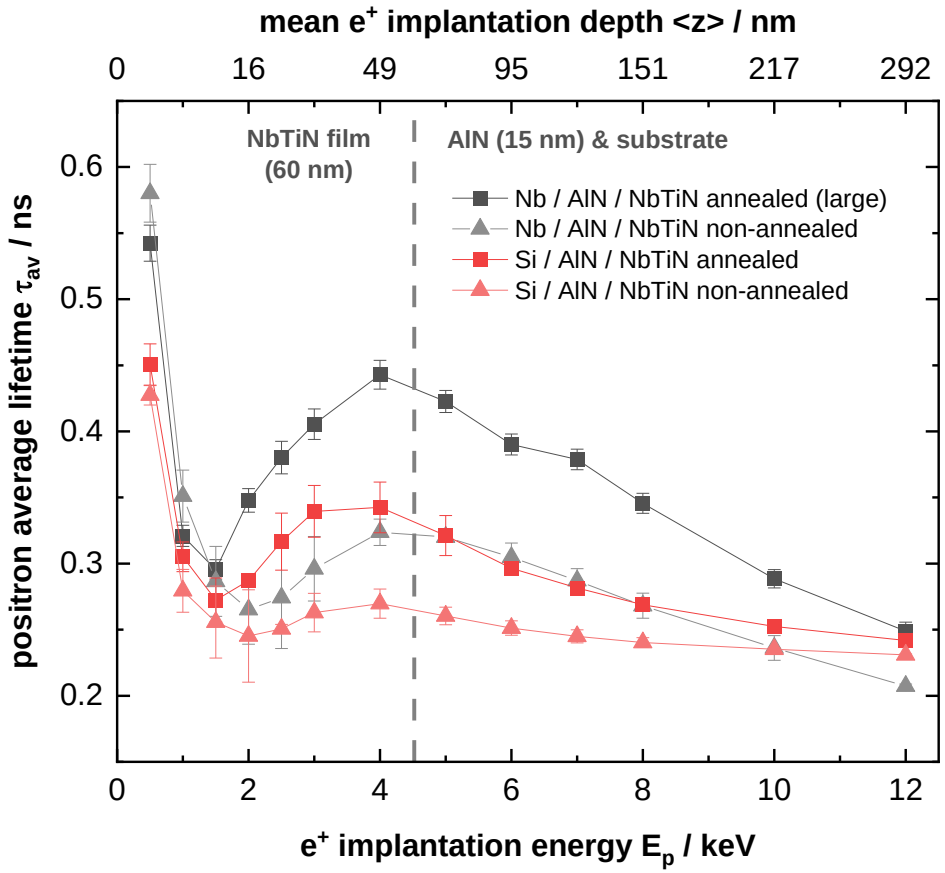

Exploring the Role of Point Defects in NbTiN Thin Films for Enhanced SRF Cavity Performance

POS25103677 - Aleksandr Zubtsovskii & Bharath Reddy Lakki Reddy Venkata, 02/2025

- beamtime @MePS → PALS (τ_{av}; τ_i; I_i)

- **18 samples** measured (**HiPIMS-NbTiN**, variation of deposition parameters)
  - deposition pressure
  - N2 flow
  - substrate bias
  - duty cylce

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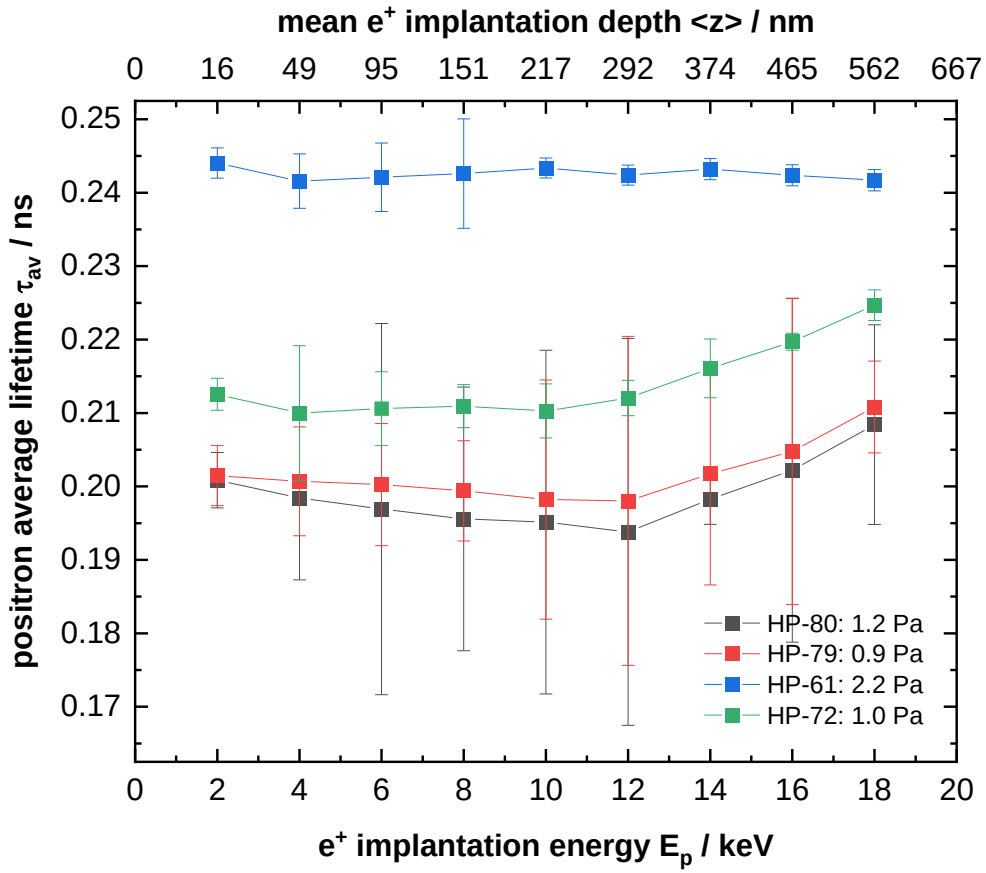

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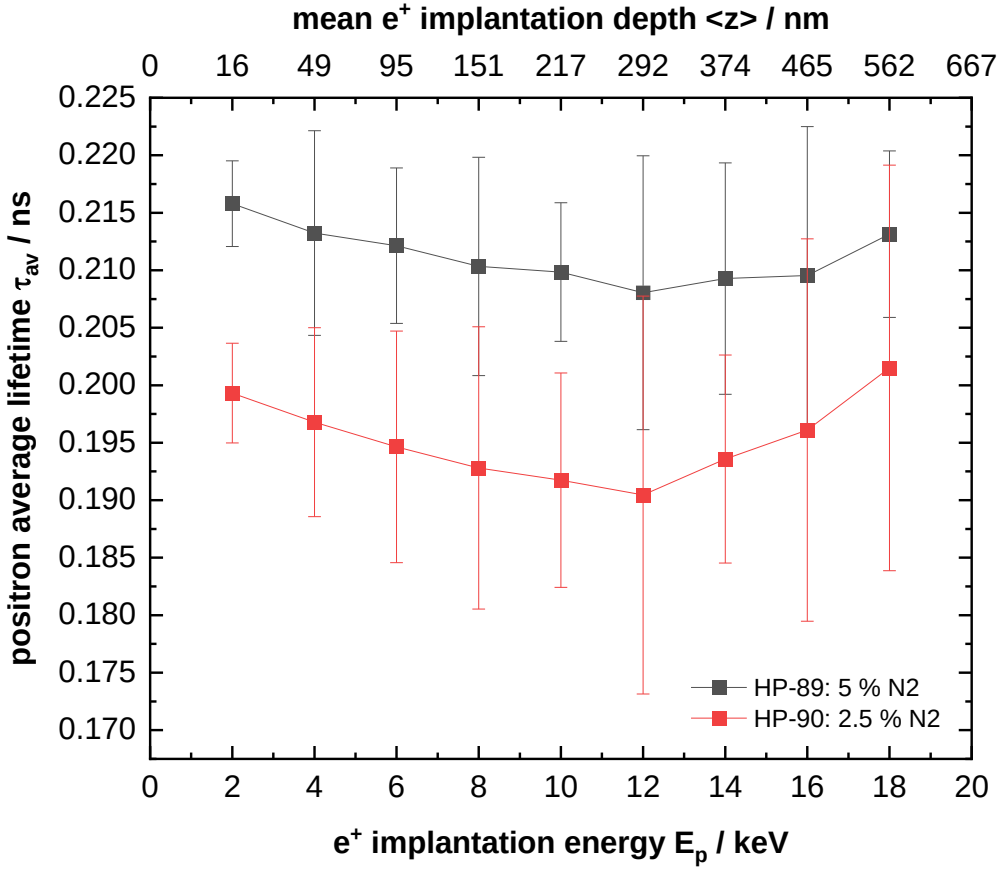

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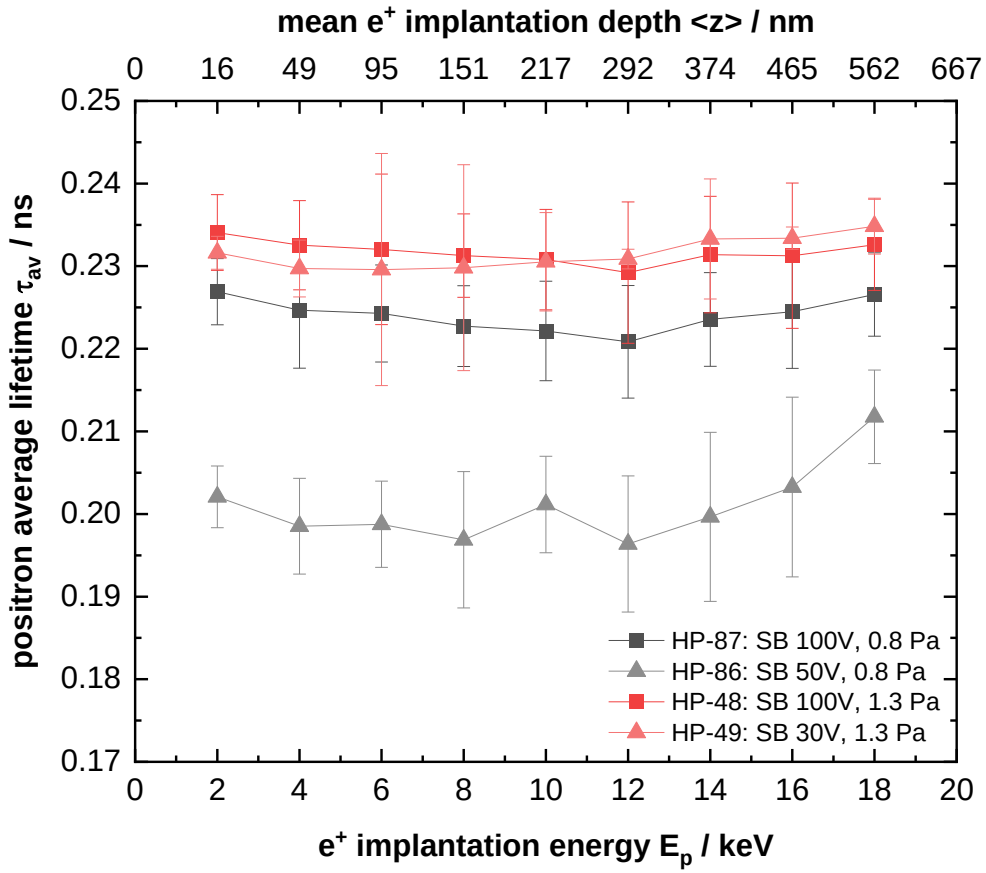

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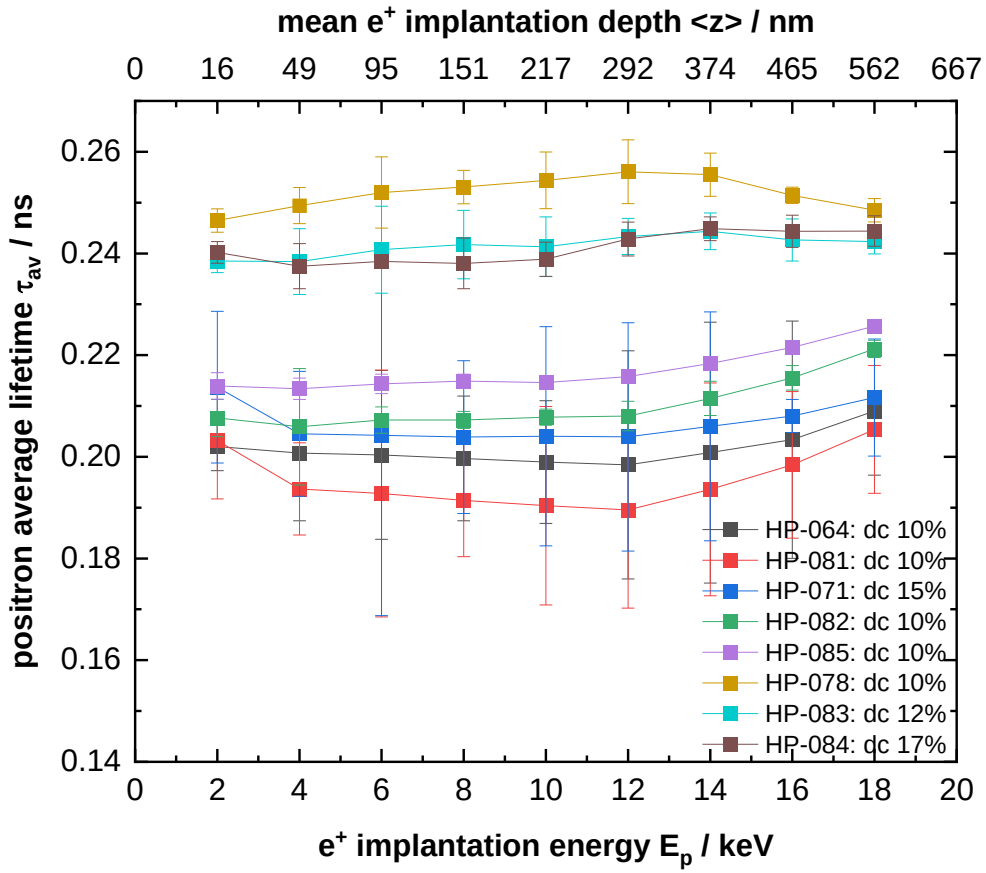


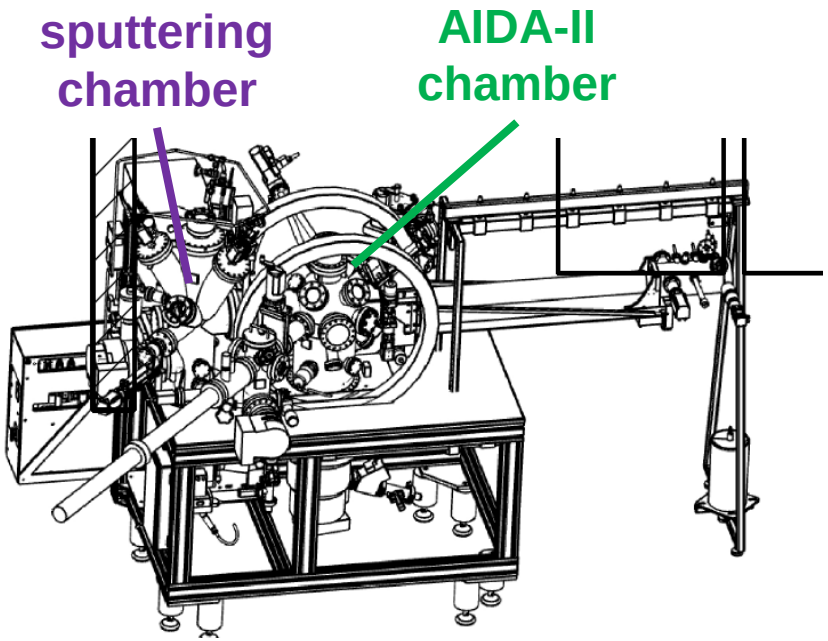
Status of my PhD project

Milestones

- ✓ introducting/training
  - ✓ defect analysis with **positrons**
  - ✓ **magnetron sputtering** (2-week stay at University of Siegen)
- ✓ PAS measurements and data analysis
- ✓ international conferences & workshops (**PSD-24**, **TFSRF2024**)

Next steps

- studying deposition parameter of **Nb** and **NbN**
  - structure & SC characterization
  - preparation for **in-situ PALS** @AIDA-II



Acknowledgements

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- Marc Wenskat

CERN

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- Andreas Wagner
- Eric Hirschmann
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Bundesministerium für Bildung und Forschung

DRESDEN concept SCIENCE AND INNOVATION CAMPUS

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