medium temperature treatments of SRF cavities at DESY

oral presentation of poster THPOGE22

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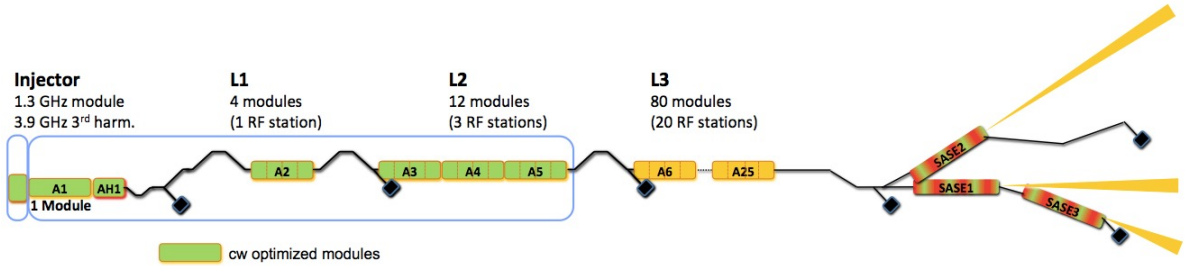
European XFEL

DESY.

European XFEL upgrade requires high performance cavities

SRF R&D @ DESY concentrates on medium temperature (mid-T) treatments

- SRF cavities for 17 modules needed
  - large quality factors for continuous wave mode
  - high accelerating gradients for pulsed mode



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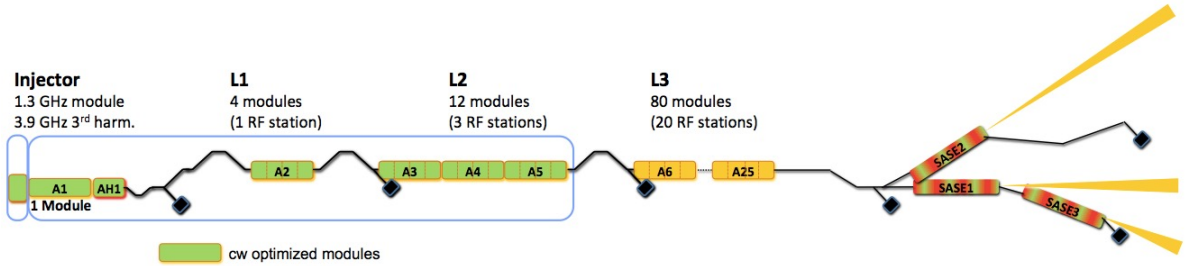

- promising mid-T studies at other institutes
  - in-situ treatments at 300 °C
  - open furnace treatments with exposure to air and HPR before performance test
  - latter process applicable to accelerator fabrication

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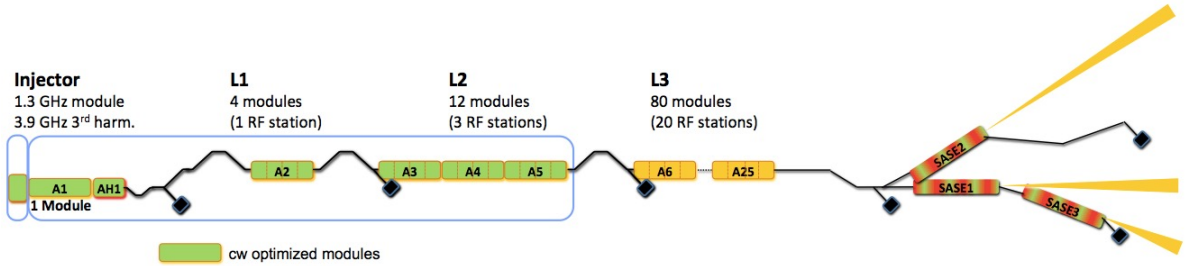

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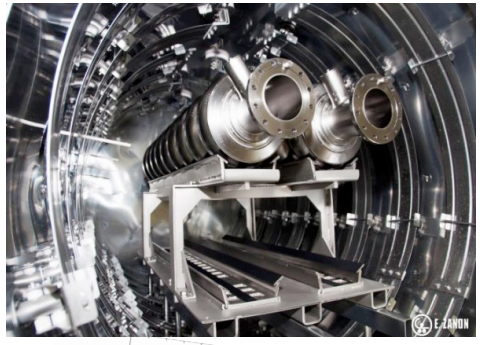

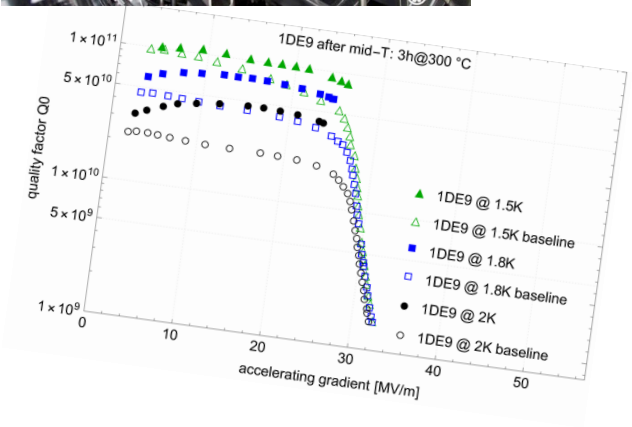

- DESY mid-T campaign started in 2021
  - cooperation with Zanon Research & Innovation Srl

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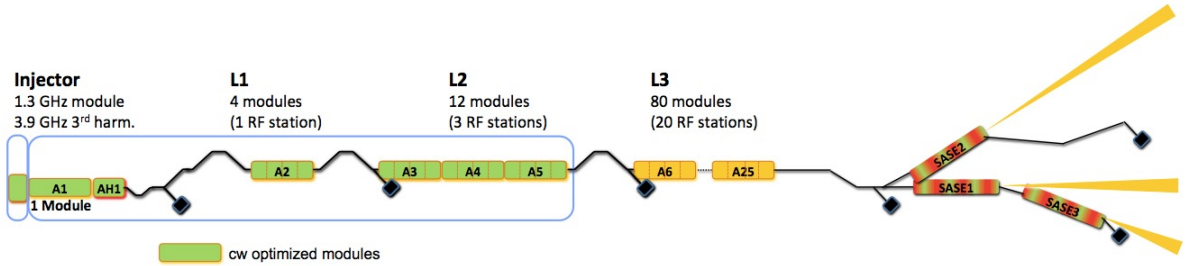

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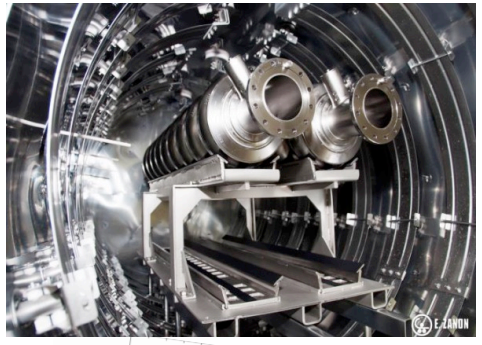

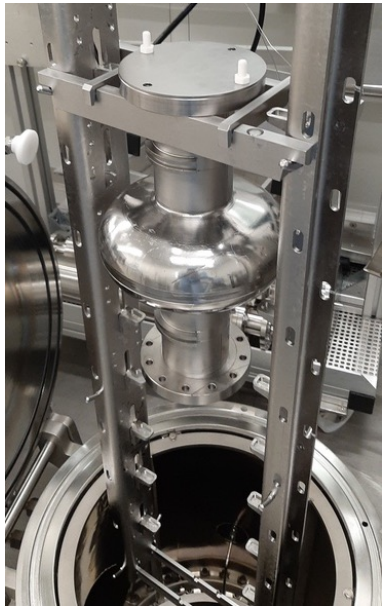

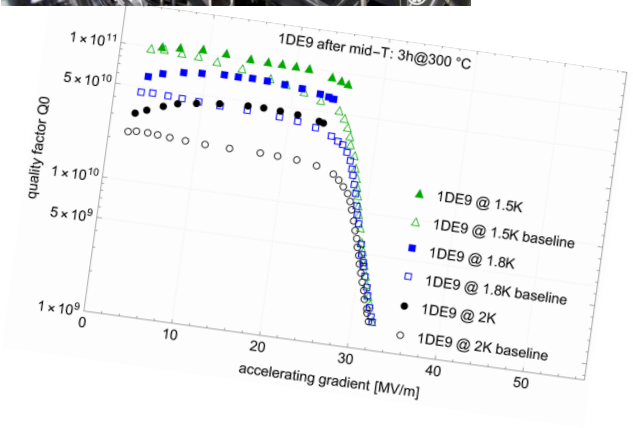

- DESY mid-T campaign started in 2021
  - cooperation with Zanon Research & Innovation Srl
  - refurbished furnace infrastructure at DESY

medium temperature treatments in a nutshell

only a teaser - details can be found on poster and proceedings

- 2 furnaces
- 6 single-cell cavities
- 7 treatments in 5 furnace runs
- 4 different recipes

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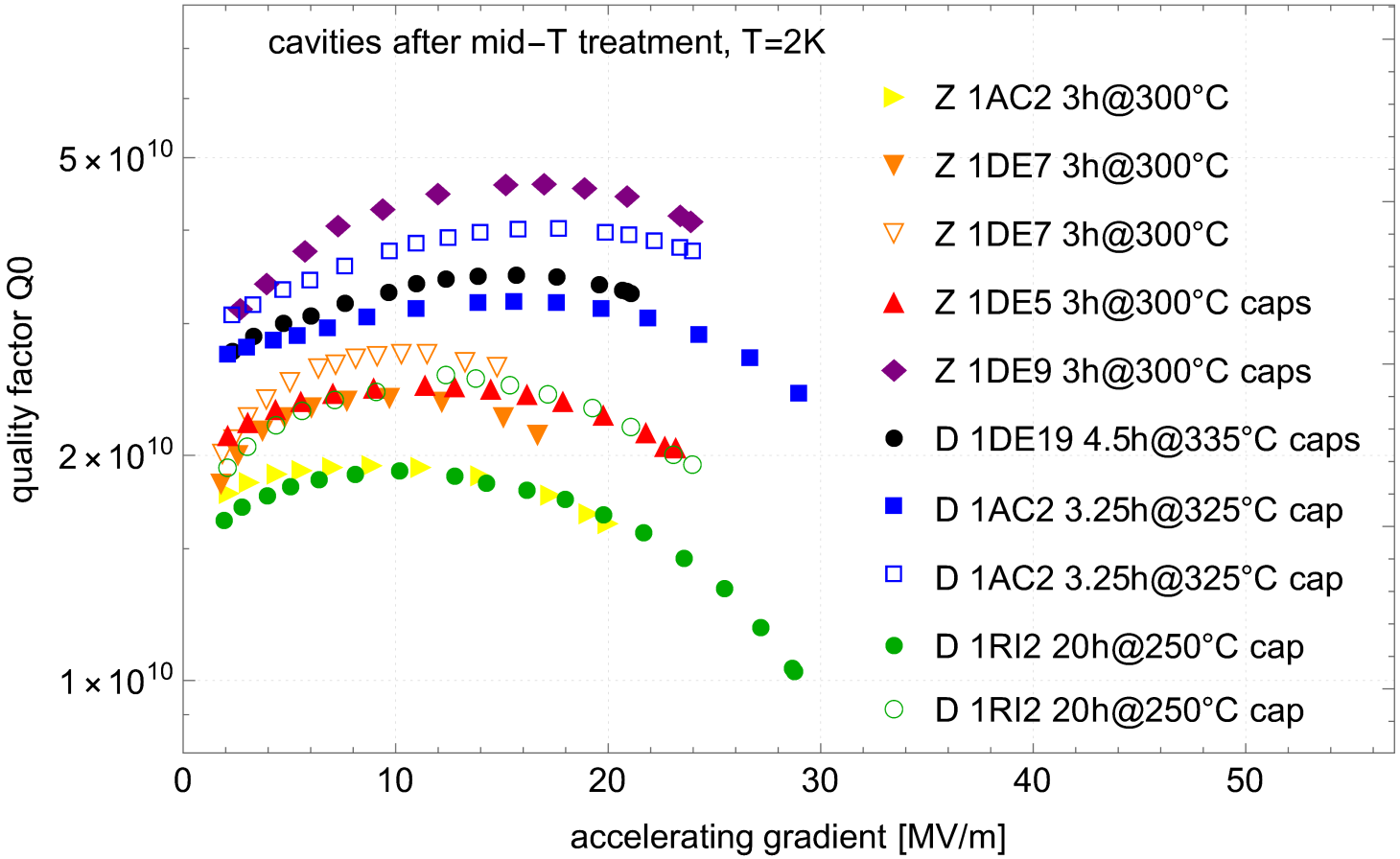
- all results with typical features
  - (strongly) enhanced quality factors
  - anti-Q-slope behaviour
  - degraded accelerating gradients
  - partially enhanced residual resistances
  - characteristic R_{BCS} behaviour



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…to be continued and expanded

- successful campaign
  - clean furnaces available, sometimes caps needed
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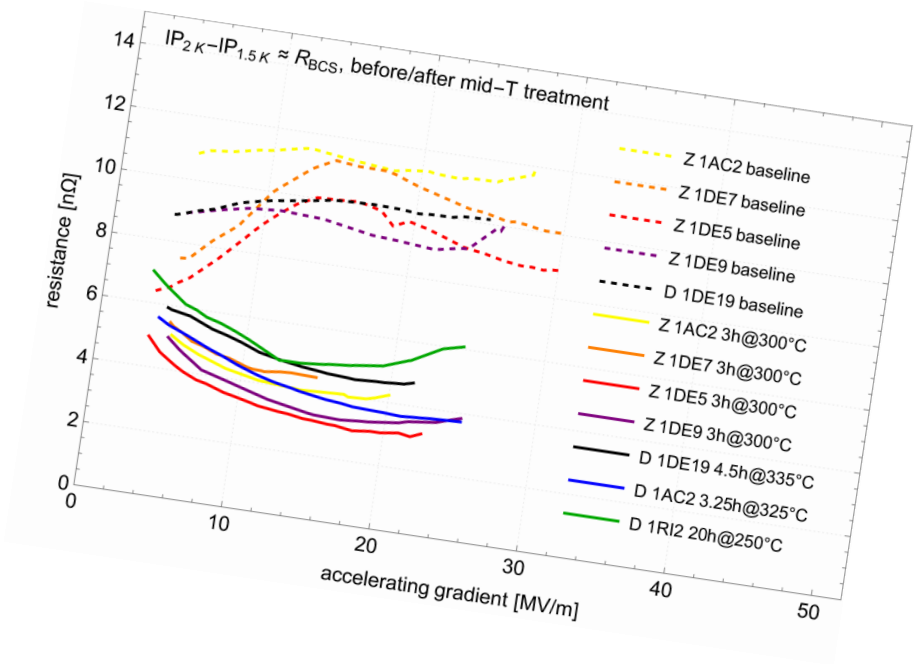
  - 2 cavities with gradients already in region of 30 MV/m



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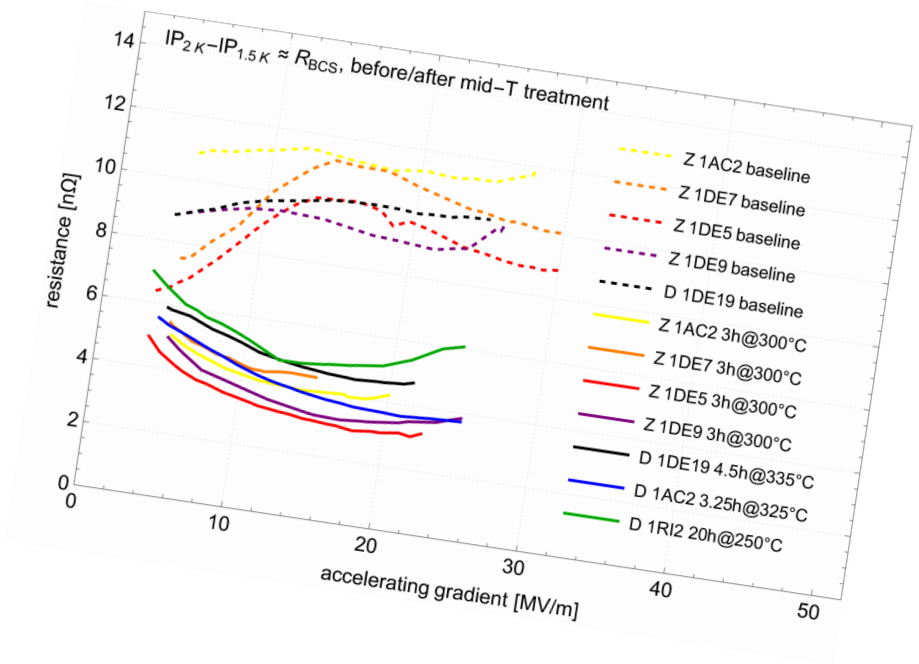
  - further furnace commissioning @ DESY
  - recipe adaptions (temperature & duration)
  - more single-cell cavities - produced at the moment



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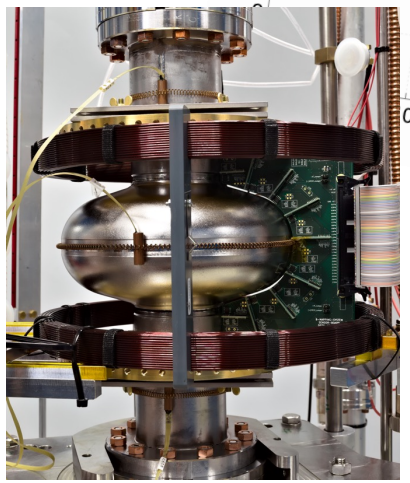

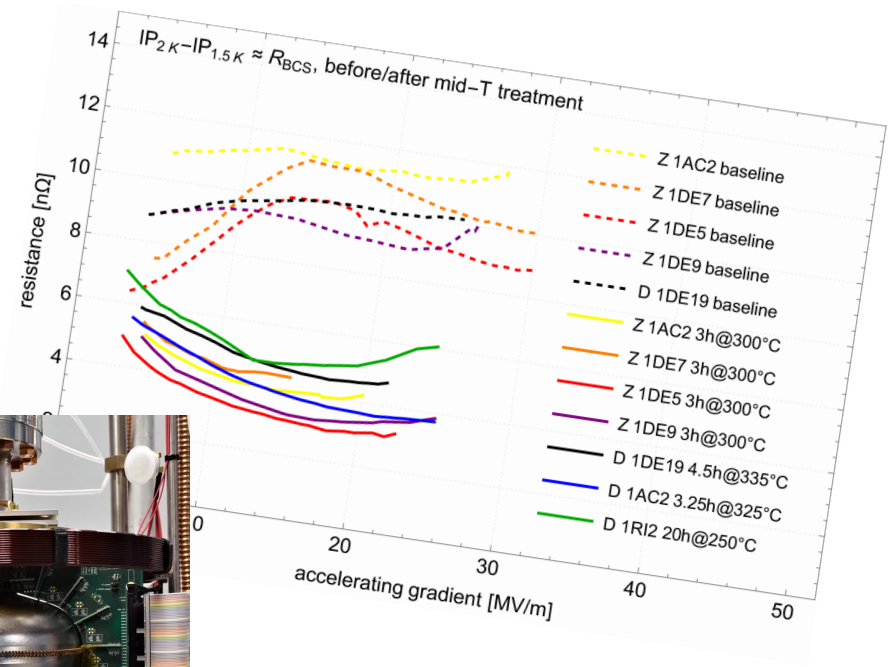

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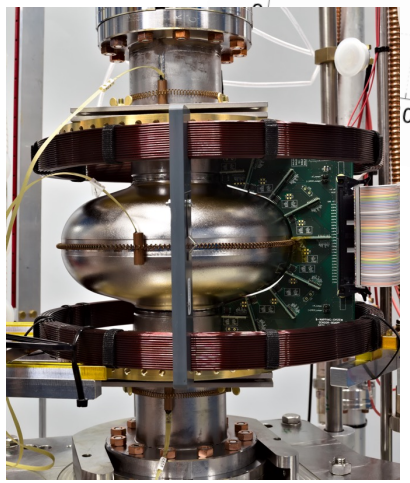

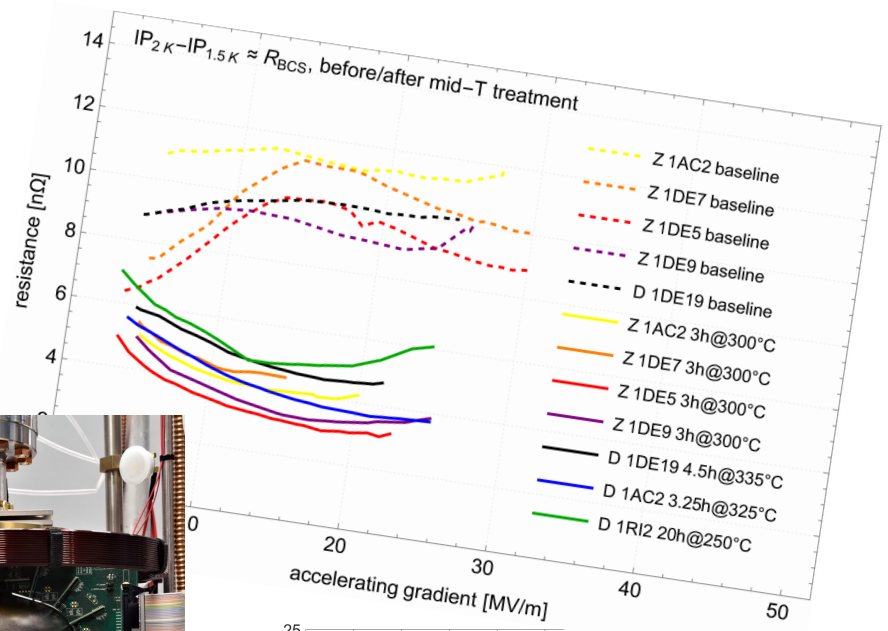

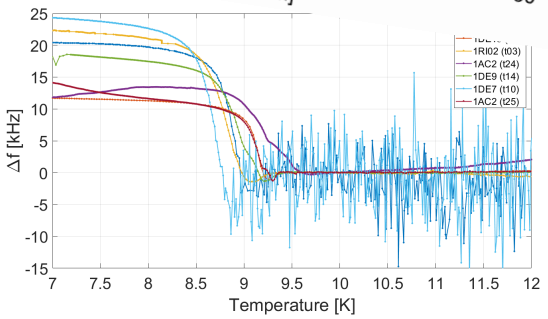

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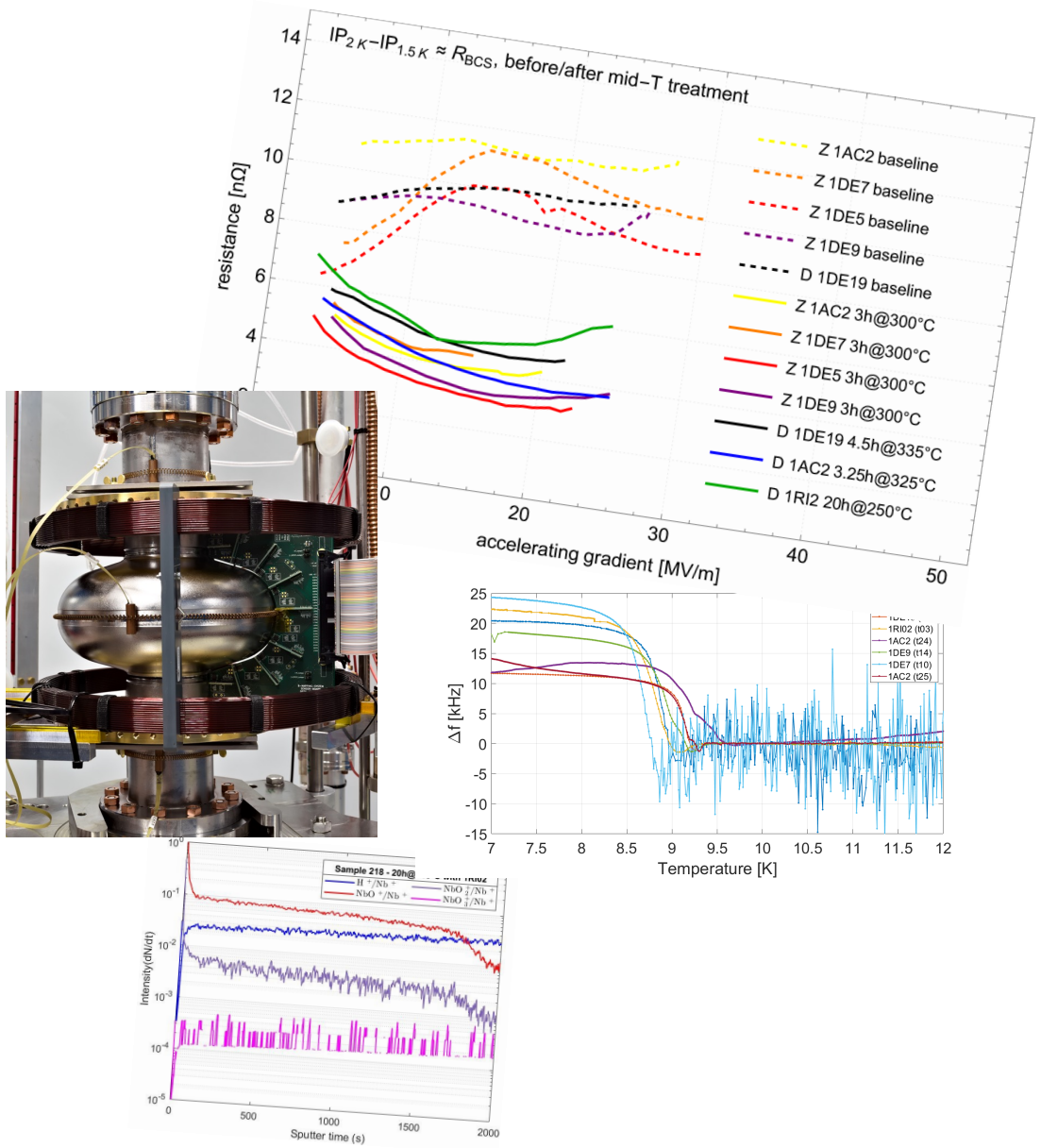

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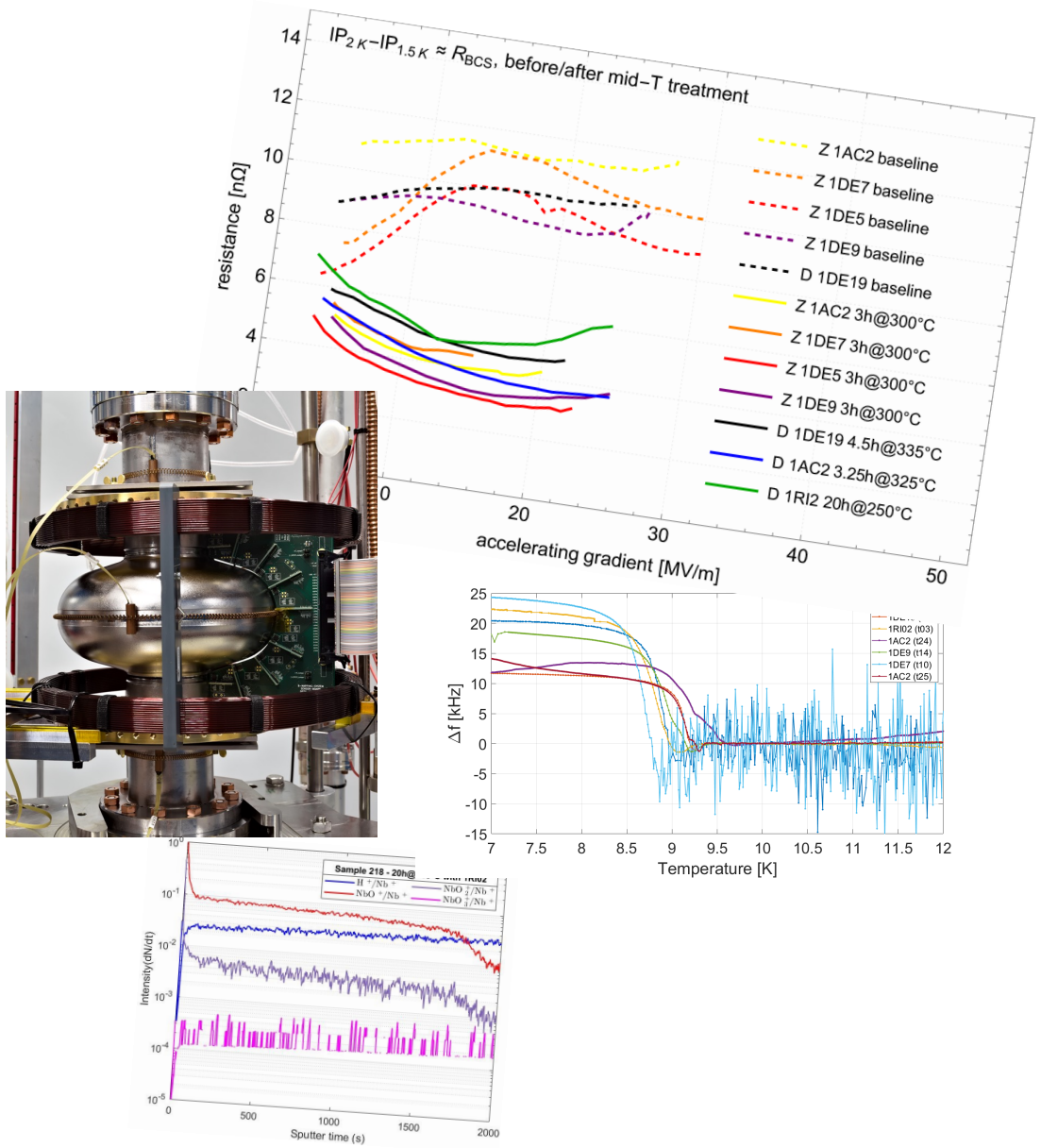

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