EU ILC-HiGrade plans and beyond

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Period: 2011-2014
Remarks on Notation and Funding

- 800 cavities purchased by European XFEL GmbH
- EC project ILC-HiGrade will end January 31, 2012
  - 24 high-gradient cavities
- EC project CRISP begins in October 2011
  - Quality assurance for XFEL cavities
  - Understanding of gradient limitations for ILC
- Helmholtz Accelerator R&D program (ARD) started 2012 and continues till 2014 to prepare transition into Helmholtz base program
- AvH funds of B Foster will partially support SRF R&D

Talk touches aspects of all these programs
Synergies with the European XFEL

- 800 cavities will be RF tested in the AMTF vertical test stands
  - want to profit from the large statistics of industrially mass-produced cavities (built to spec)
  - understand the failures of cavities and remove limitations
- 24 ILC-HiGrade cavities will be optimized
- 100 cryomodules will arrive at DESY and will be high-power tested
  - understand limitations and gradient variations

This will be the main effort 2012-14
Beyond the base programme

• Primary interest of DESY is in cw operation
  • Initial test of mixed-mode operation, i.e. pulsed and cw
    • 80 kW IOTs (300 ms and cw)
    • 5.5 MV/m cw and 11 MV/m pulsed
    • Stability $10^{-3}$
      • LLRF challenge
  • Cavity $Q_0$ is most relevant for cw-operation

Develop high $Q_0$-cavities
(and consequently high) $E_{acc}$)
Further options of cavity development

• Hydroforming of cavities has proven to be effective in shaping cavities
  • too late to be qualified for European XFEL

• Single crystals
  • would like to continue initial program
    9-cell cavities

recommission tumbling machine?
Increasing rf-breakdown field of SRF cavities by multi-layer coating

• Thin multilayer coating (SISI)
  • layer thickness below London penetration depth
  • Thin layer to retain superconducting state beyond critical B-field
    • Fine tuning of layer important to avoid Josephon junction across layers
  • Requires single crystal
    • to avoid flux-penetration at crystal boundaries

Plans are slowly taking shape
Summary

- DESY will focus on proper handling of the 800+ cavities for the European XFEL

- Future laboratory interest is primarily focused on cw-operation
  - single crystal cavities
  - hydroforming

- Systematic studies of gradient limitation

High statistics

Material and surface science