

# EU ILC-HiGrade plans and beyond

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*Period: 2011-2014*



# Remarks on Notation and Funding

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- 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

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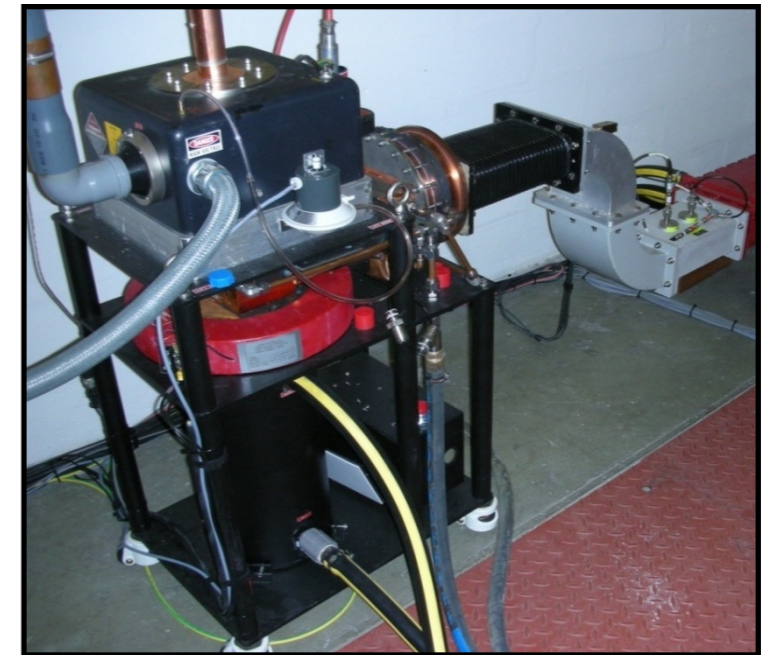
- 800 cavities will be RF tested in the AMTF vertical test stands
  - want to profit from the large statistics of industrially mass-produced cavities (built to spec)
  - understand the failures of cavities and remove limitations
  - 24 ILC-HiGrade cavities will be optimized
- 100 cryomodules will arrive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

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- 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

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- 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

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- Thin multilayer coating (SISl)
  - 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 accross layers
- Requires single crystal
  - to avoid flux-penetration at crystal boundaries

*Plans are slowly taking shape*

# Summary

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- 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*

*Q<sub>0</sub>*

*Material and  
surface science*