



# HarmonLIP: Harmonic Cavity Systems for Future Generation Light Sources

Proposal to the LEAPS GA

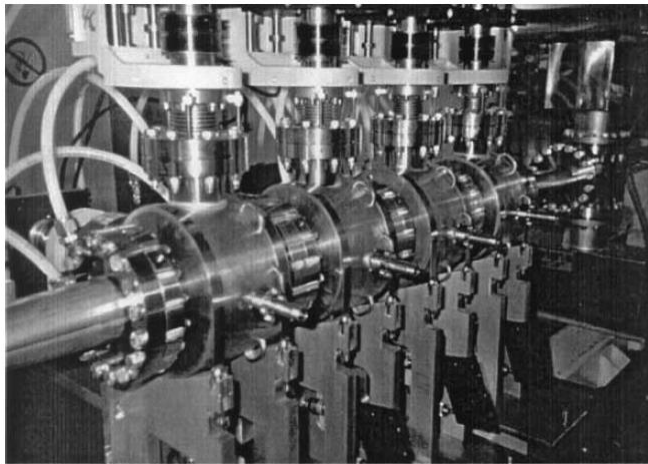
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# Why Harmonic Cavities ?

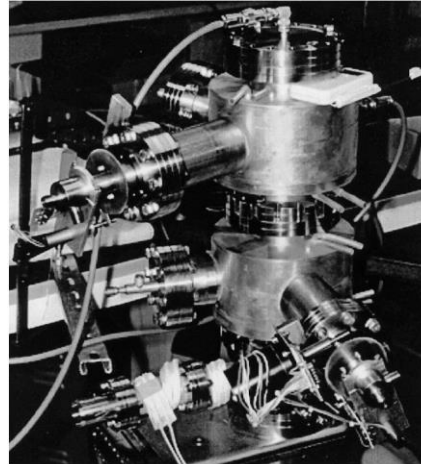
- HCs are used since many years in third generation sources to lengthen the electron bunches in order to
  - Improve beam lifetime
  - Improve stability

BESSY II



M.Georgsson et al., NIM A 369 (2001) p.373

MAX II



M. Georgsson et al. Eriksson, NIM A 416 (1998) 465

SLS

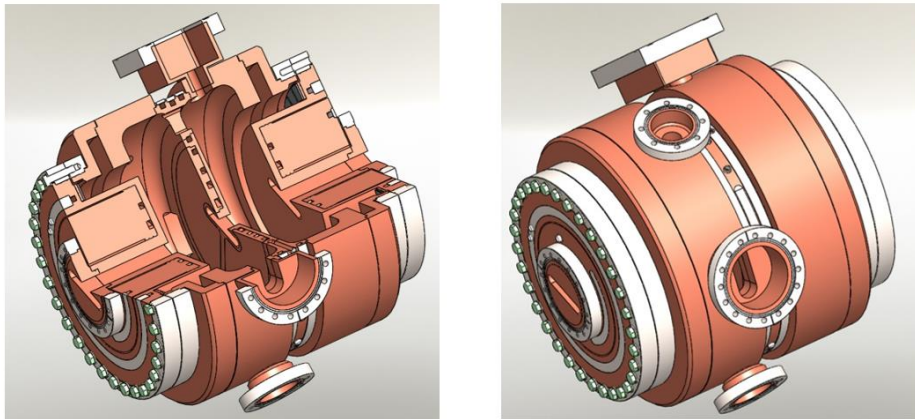


Pedrozzi et al., Proc.11th Workshop on rf Superconductivity (2003) ✓

# Harmonic Cavities in Fourth and Future Generation Rings

- Harmonic Cavities are even more relevant in fourth and **future** generation storage rings
- **Long bunches** will be a key ingredient to achieve the ultimate goal of diffraction limited sources.

Harmonic Cavity System design study for ESRF-EBS



A. D'Elia, J. Jacob and V. Serrière – ESRF.  
ESLS-RF Nov 2021

Harmonic Cavity in operation at MAX IV



# Why HarmonLIP ?

- The main purpose of the HarmonLIP Leaps Internal Project is to **foster information exchange and joint research efforts** amongst the LEAPS members for the further development of harmonic cavity/bunch lengthening systems for present and **future ultralow** emittance storage rings.
- This internal project activity is expected to evolve into a proposal to a future HORIZON Europe call.
- Activities
  - Regular seminar series (once every 2 months in zoom)
  - Workshop series (once a year)
  - Joint experiments in Leaps facilities
- Topics
  - Beam dynamics simulation tools for stretched bunches
  - Bunch-by-bunch feedback challenges for stretched bunches
  - Harmonic systems for extremely long bunches
  - Experimental Characterization of stretched bunches and stretched bunch stability
  - Intra-beam scattering for non-Gaussian bunches – theory and experiment.
  - Transient beam loading in harmonic systems.
  - **And more !**

# Labs that have expressed interest

- HZB
- PSI
- ELETTRA
- Consortium
  - SOLEIL
  - ESRF
  - HZB
  - PSI
  - KEK
- Consortium
  - HZB
  - DESY
  - ALBA