

PETRA IV

Overview and RF System

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DESY-TEMF-Meeting ,June 13, 2019

PETRA IV – Timeline

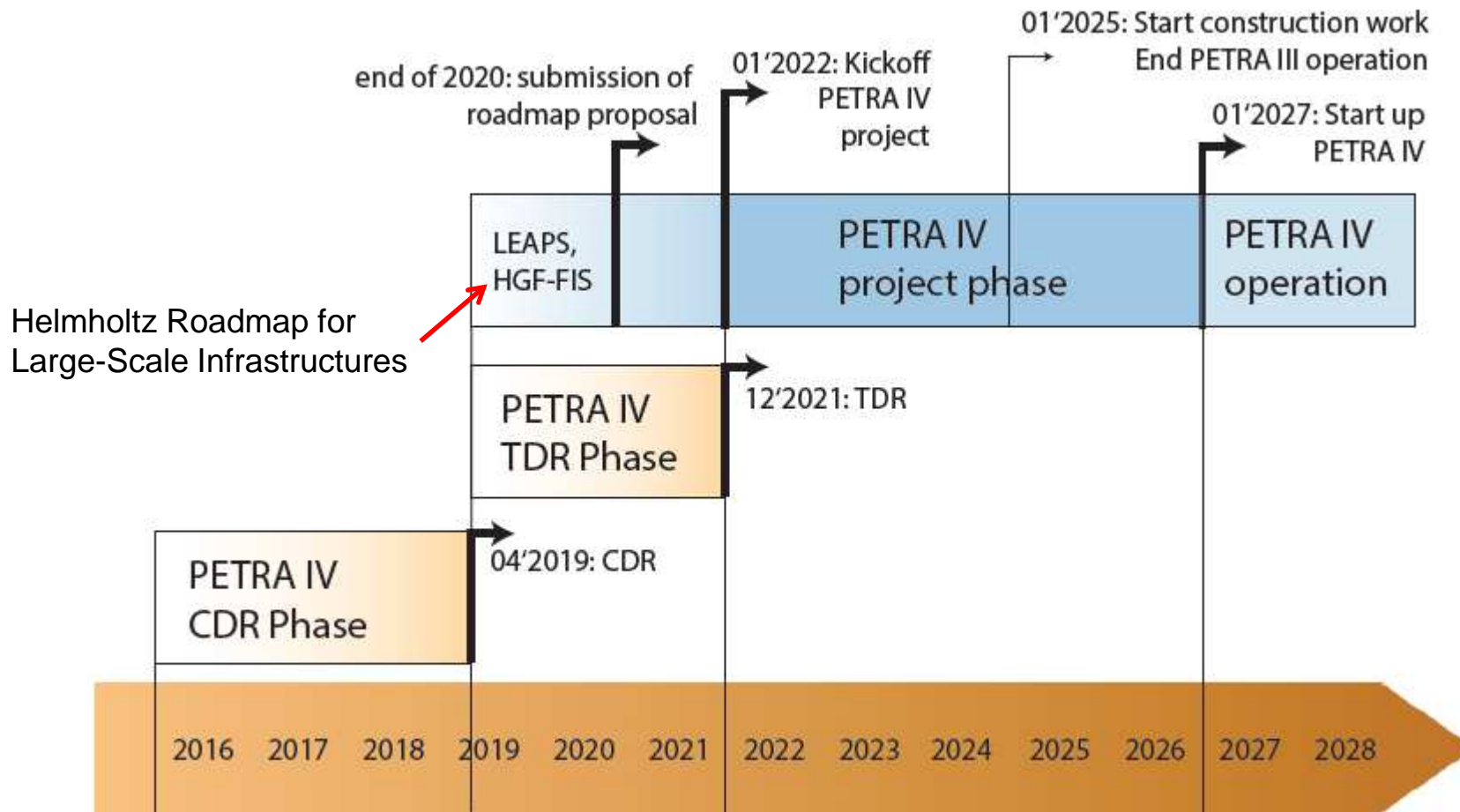
Presently: CDR preparation phase

FIS-process pre-proposal submitted

Helmholtz association:

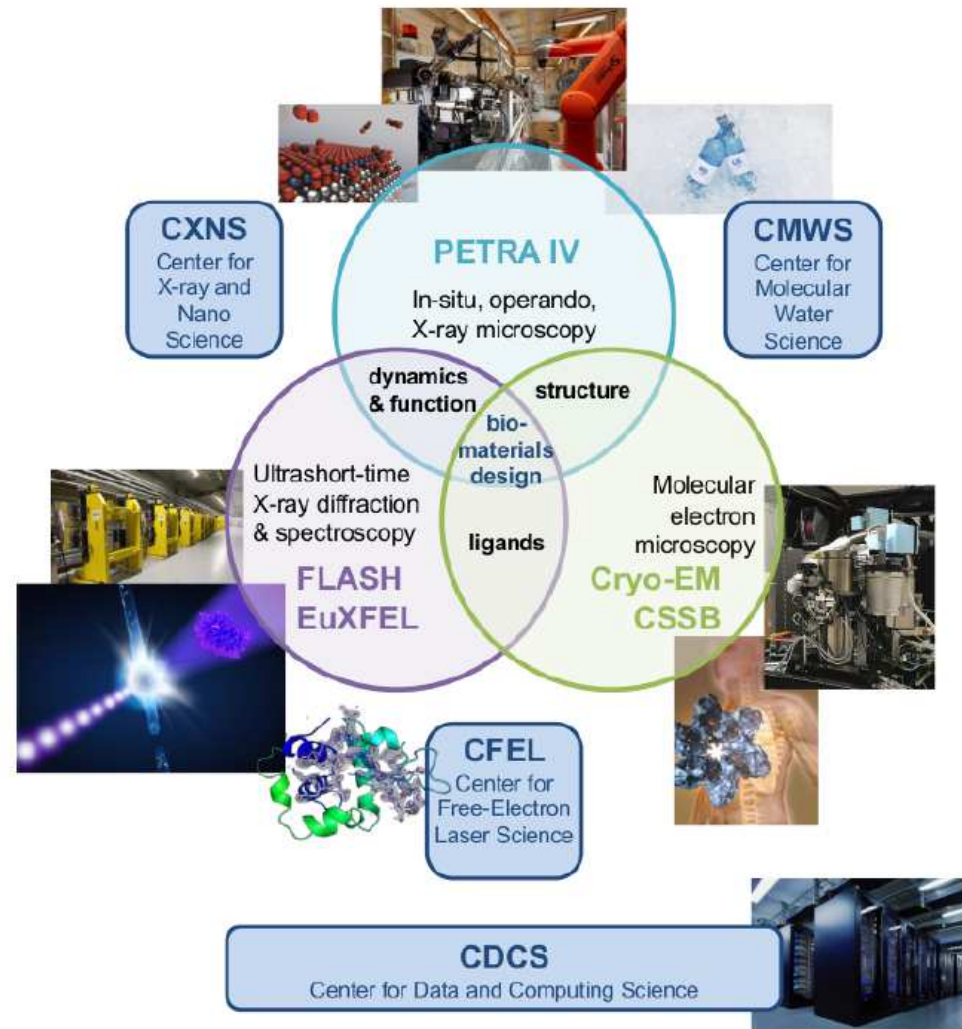
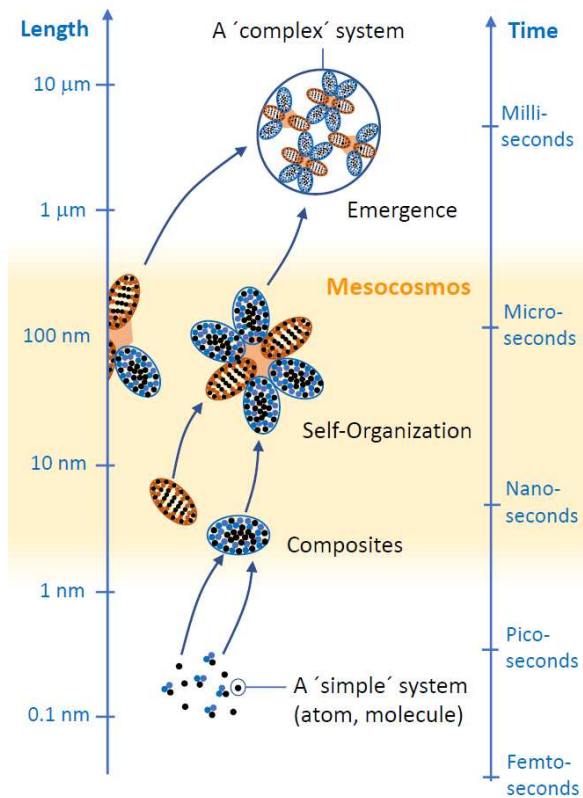
FIS = **F**orschungs**I**nfra**S**truktur

Large-scale research infrastructure

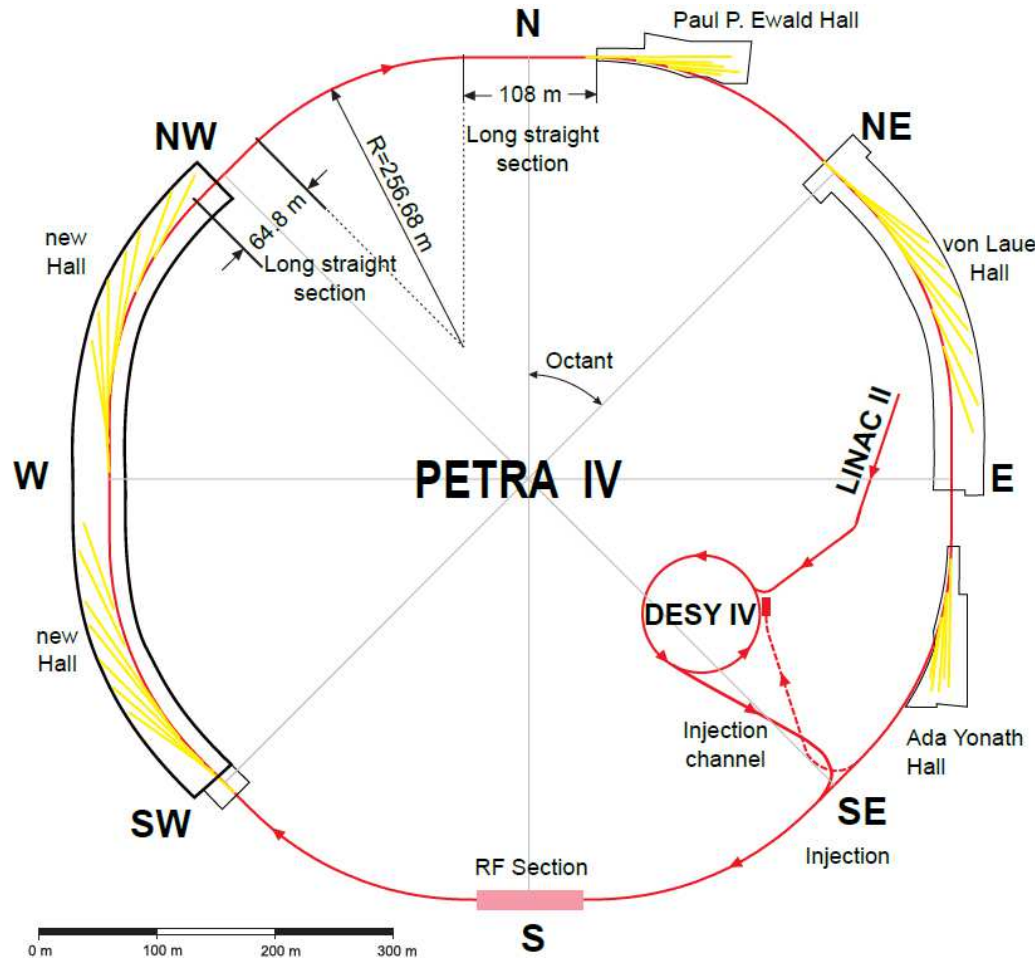


Science Case

PETRA IV contributes to the analytic techniques that are available at DESY and the Science City Bahrenfeld



PETRA IV conceptual design



Storage Ring:

Baseline: H7BA style lattice (64 cells)
(ESRF-EBS style lattice)

on axis injection,

Option (considered during TDR)
maintain several beamlines
(23 m long cell with strong magnets)

Injector:

new booster synchrotron, DESY IV
low emittance ~ 20 nm rad

refurbished Linac II

with full intensity gun

Option

consider the possibility to include in
the future an injector based on
laser plasma wakefield acceleration

Technical sub-systems:

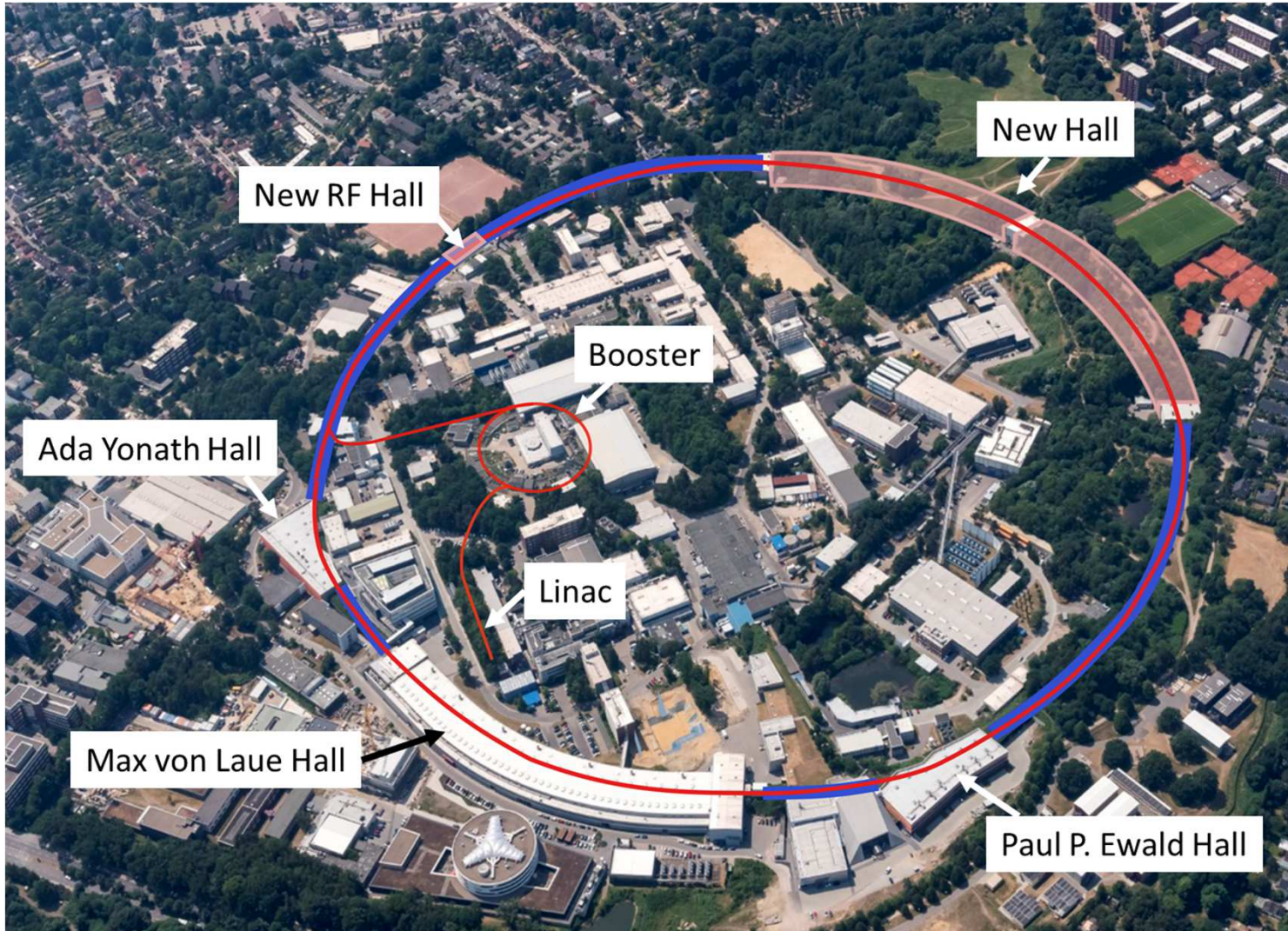
Magnets, bore radius 13 mm

Option: 9 ... 10 mm

Vacuum system, 10 mm inner radius

Option: 7 mm

PETRA buildings are based on tunnels and halls from different construction periods



in blue
tunnel from
1976

PETRA
legacy

RF System

RF systems

500 MHz (harmonic number $h = 3840$)

and

a third harmonic system 1.5 GHz

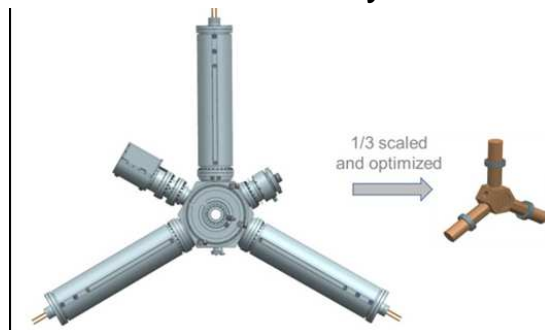
HOM-Damped EU-Cavity (BESSY), $R_s = 3 \text{ M}\Omega$
20 single cell cavities, total voltage 6 MV ... 9 MV

3rd harmonic cavities, ~ 2 MV,

→ 22 mm long bunches

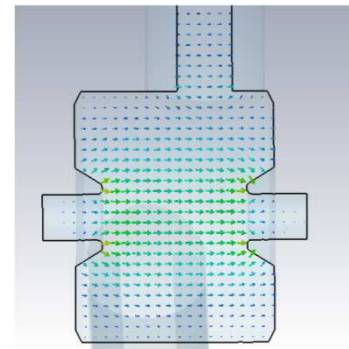
mitigation of IBS for the timing mode (80 bunches x 1 mA)

ALBA: scaled cavity

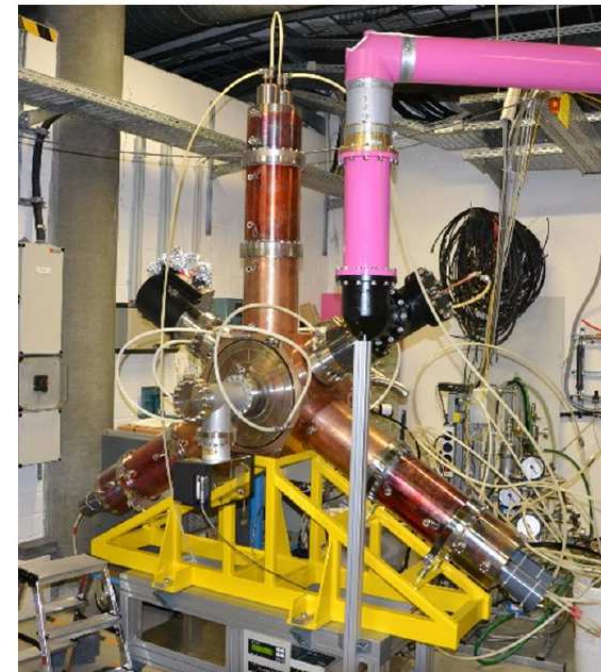


Beatriz Bravo et al.
IPAC 2017, THPIK078

CST model



Collaboration with
TEMF

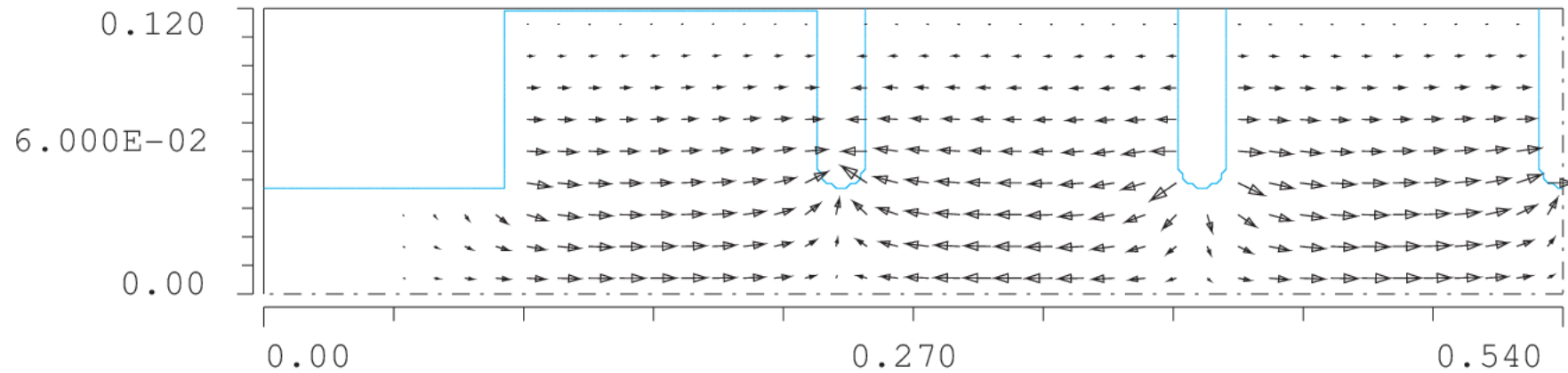
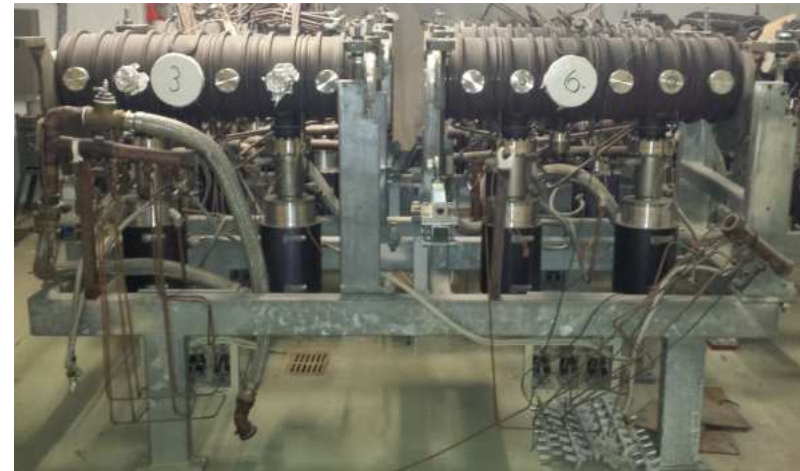


Courtesy of Wolfgang Anders, HZB

Higher harmonic cavities

Ideas for a test in PETRA III:
Installation of refurbished **1 GHz cavities**
from PETRA I
(6 cell cavities)

Test runs at 3 GeV



Thank you for your attention !