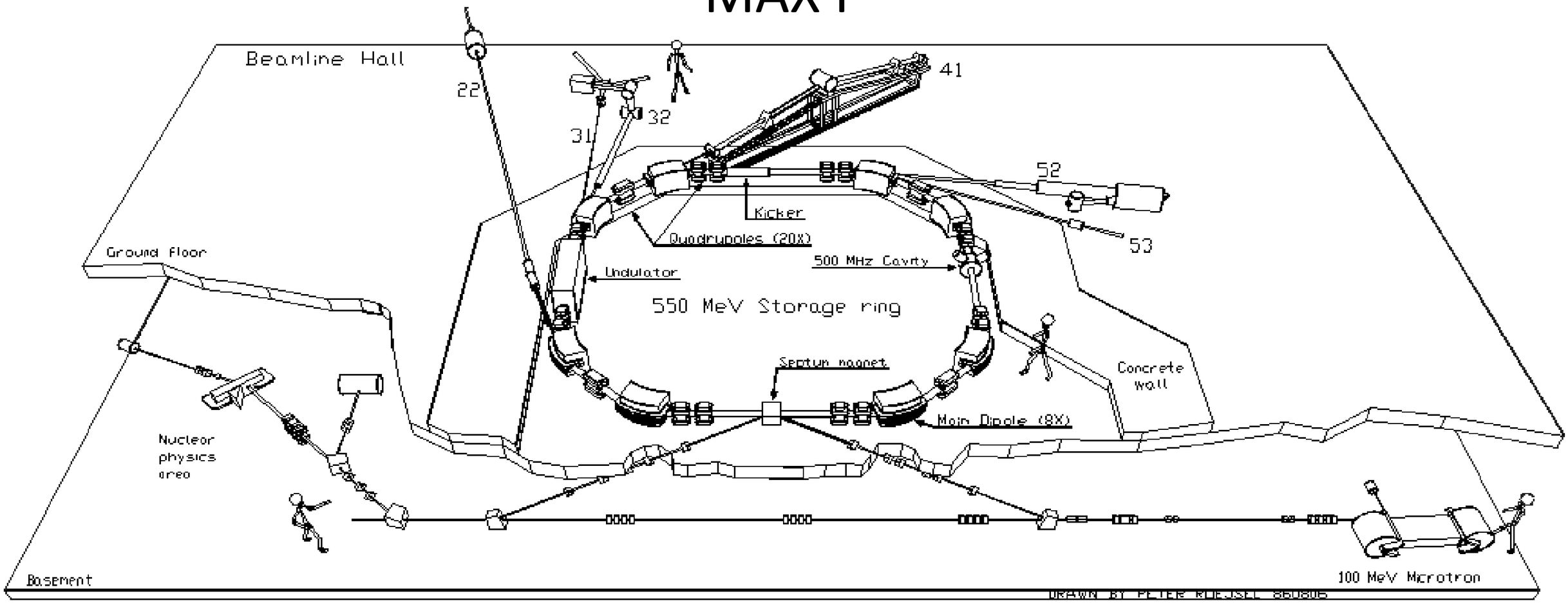
The MAX Story: From Microtron to MAX IV

M. Eriksson, IPAC'14

We are very proud and honored for the Wideröe Prize:

Hat off for the MAX staff, our international colleagues and co-workers in industry!

MAX I

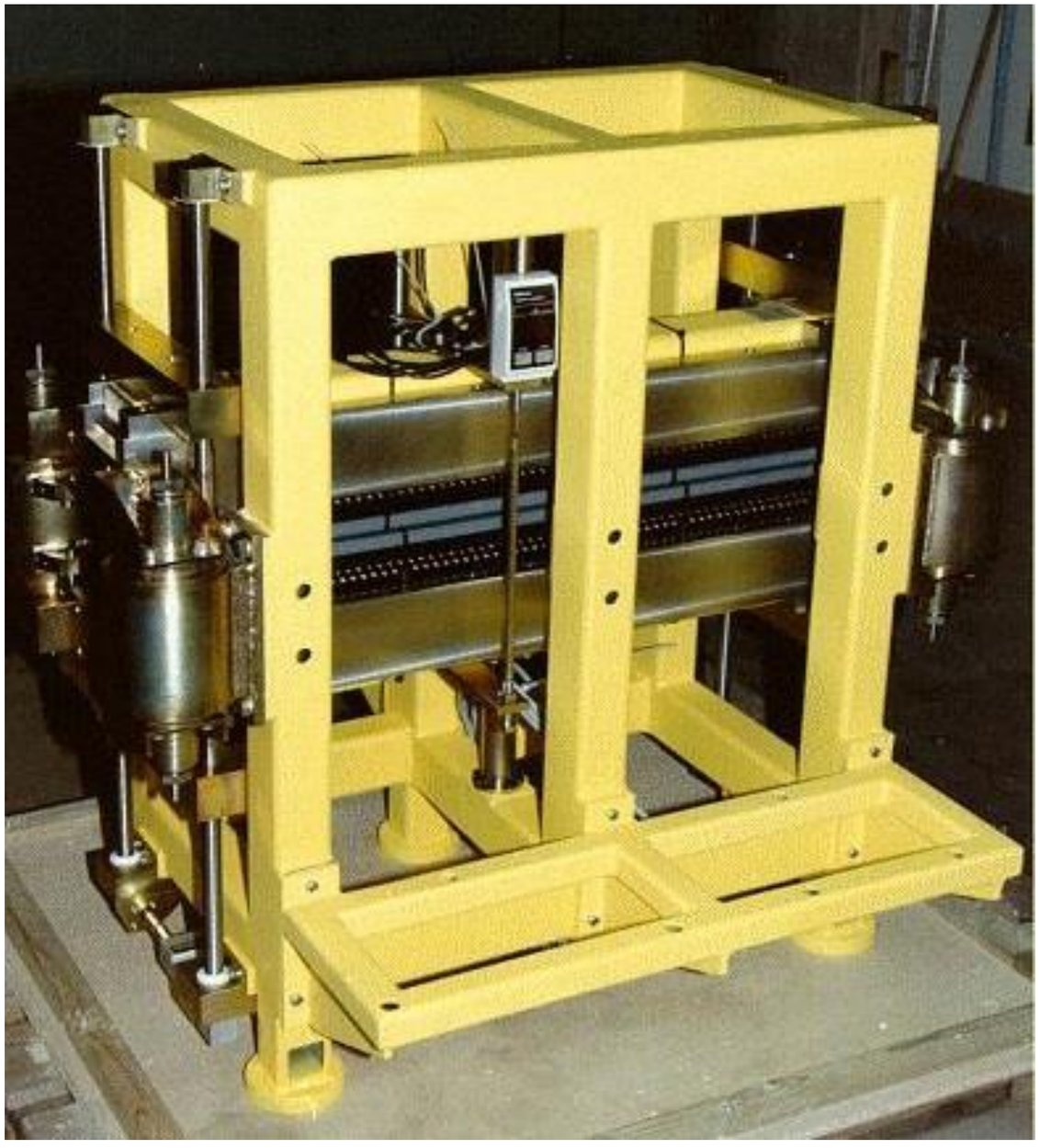


Storage mode	
Max energy	550 MeV
Circumference	32.4 m
Max circulating current	250 mA
Horizontal emittance	40 nm rad
RF	500 MHz
Bunch length (FWHM)	80 ps
Beam life-time	4 hours

Pulse-stretcher mode	
Max energy	75-100 MeV
Duty factor	50-80 %
Operating current	50-100 nA

M. Eriksson, IPAC’14

Short period, variable vacuum chamber undulator at MAX I



First operation in 1992

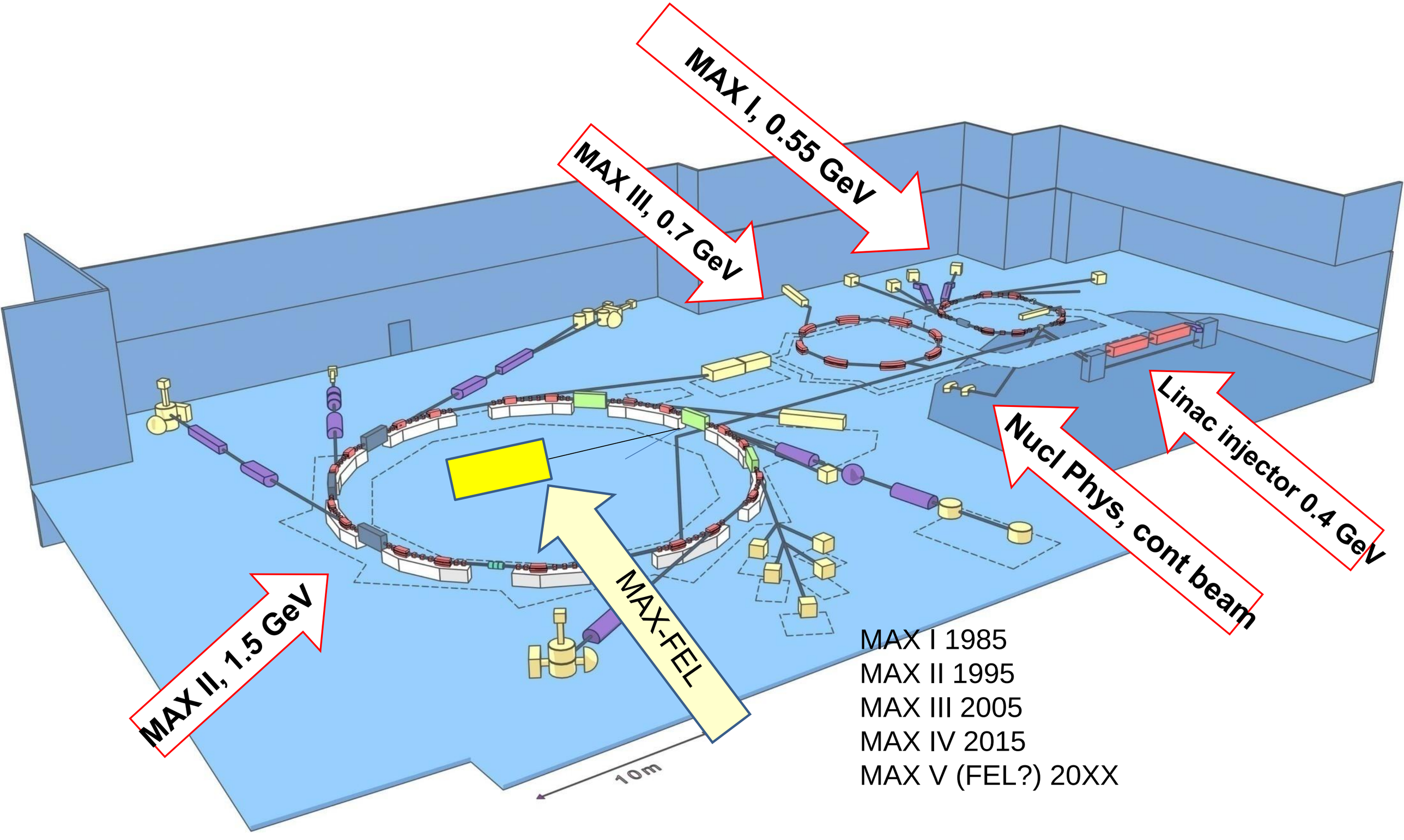
- Period length 24 mm
- Number of periods 34.5
- Total length 1036 mm
- Vacuum gap, variable 6.2 - 20 mm
- Magnet gap, variable 7.7 - 140 mm
- Maximum peak field 0.76 T
- Maximum K 1.68
- Photon energy range 60 - 600 eV

Used for the Finnish beamline 51

Atomic, molecular, liquid and solid state electron spectroscopy

Å. Andersson et al., Nucl. Instr. and Meth. in Phys. Res. A **362**, 586, 1995

M. Eriksson, IPAC'14

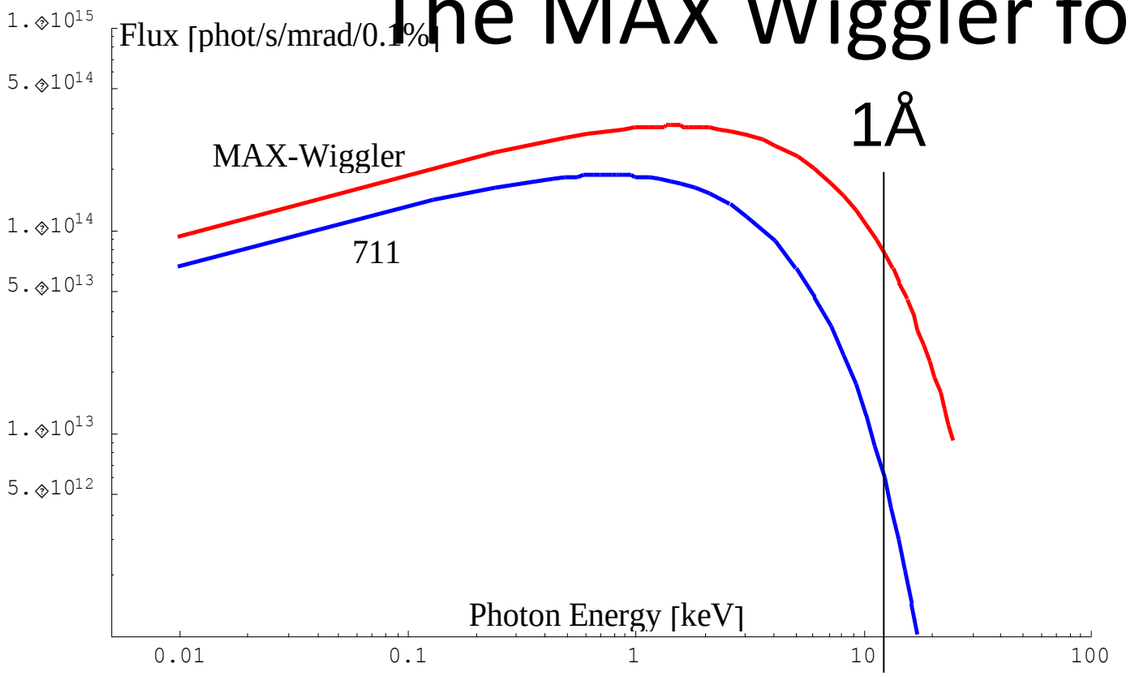


MAX I 1985
MAX II 1995
MAX III 2005
MAX IV 2015
MAX V (FEL?) 20XX

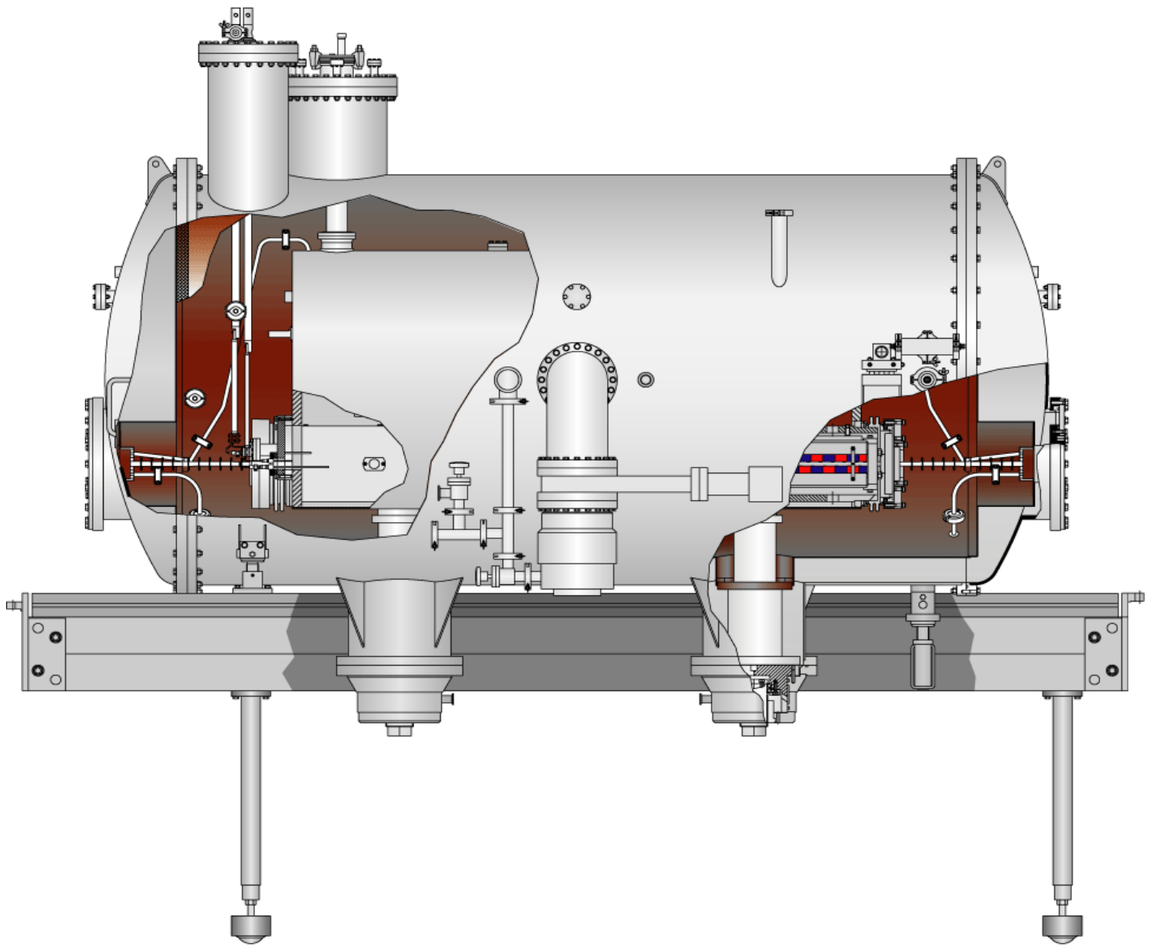
M. Eriksson, IPAC'14

M. Eriksson, IPAC’14

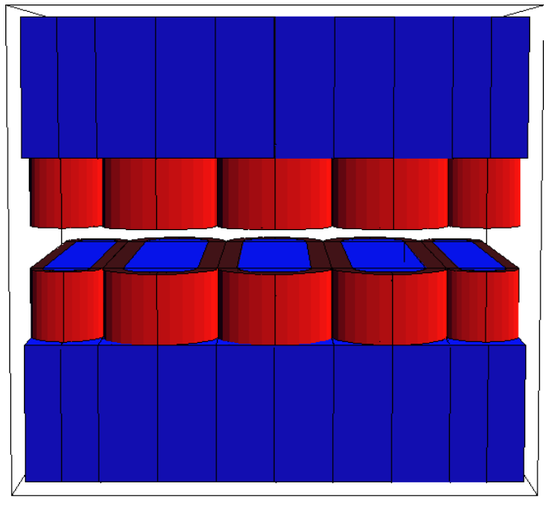
The MAX Wiggler for beamlines I811 and I911



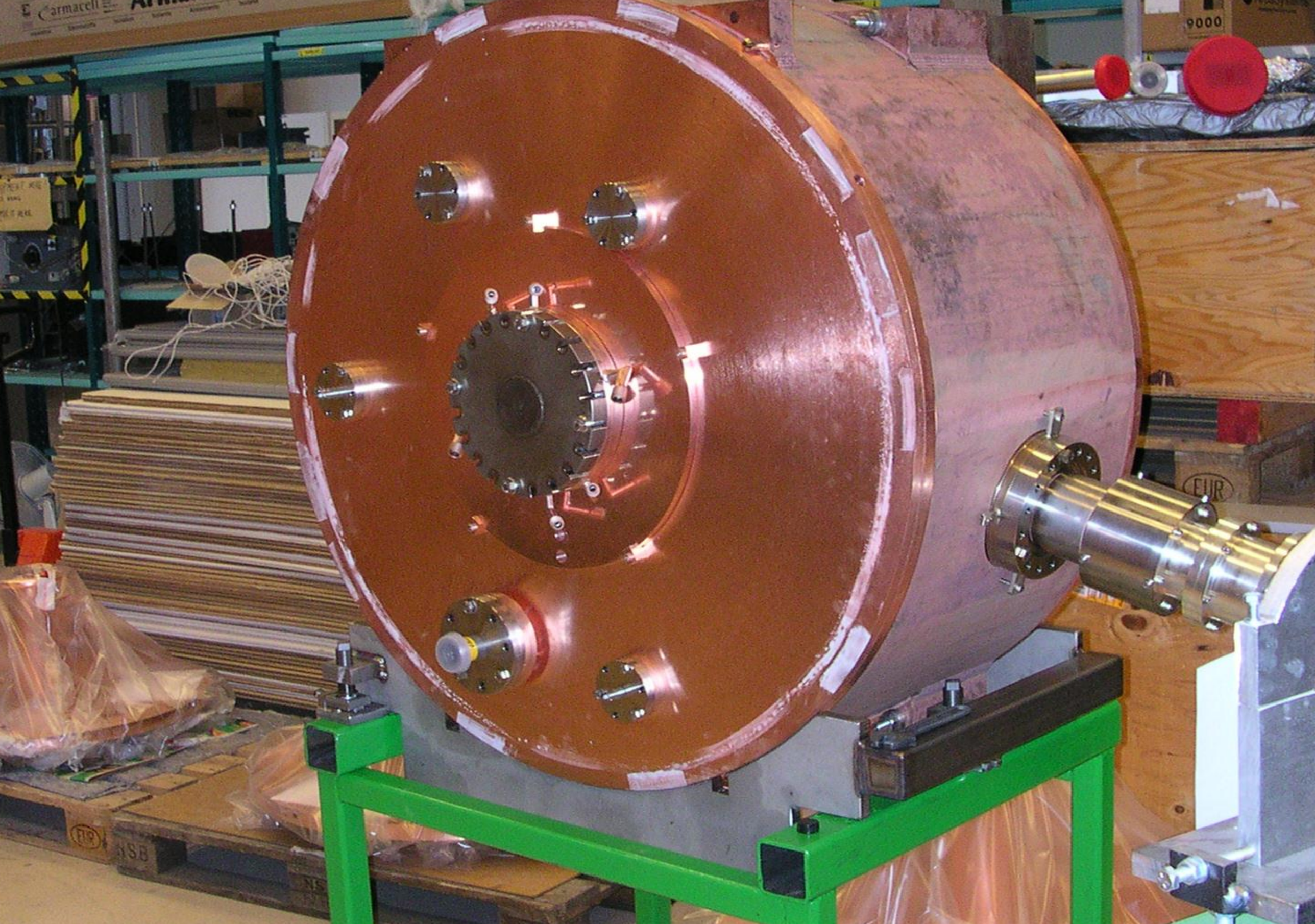
Spectral flux from a 47-pole wiggler with a 3.5 T peak field compared to a 27-pole wiggler with 1.8 T peak field (711).



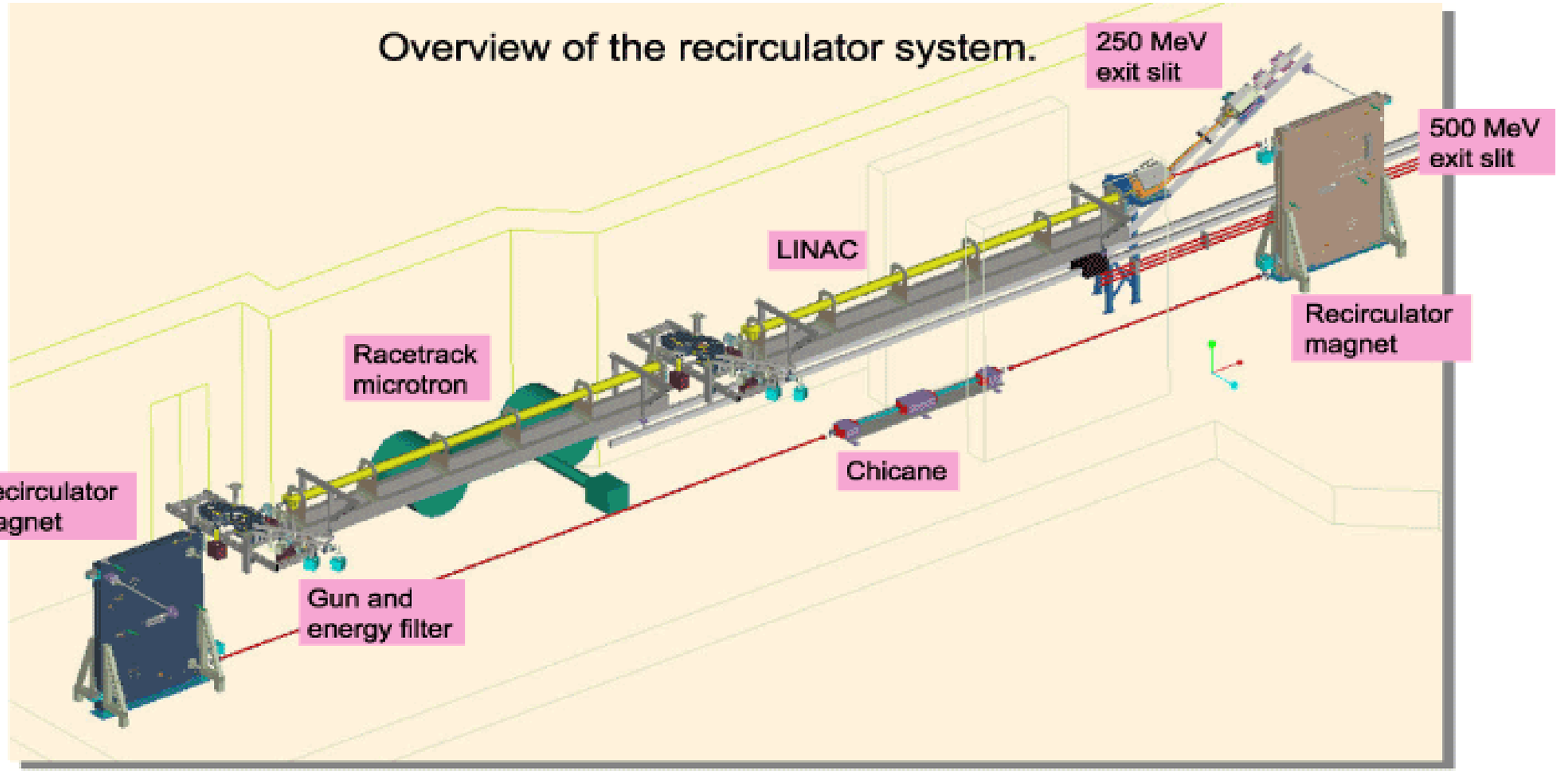
Schematic layout of the prototype MAX-Wiggler, showing the coils, the iron central cores and the return yokes.



M. Eriksson, IPAC'14

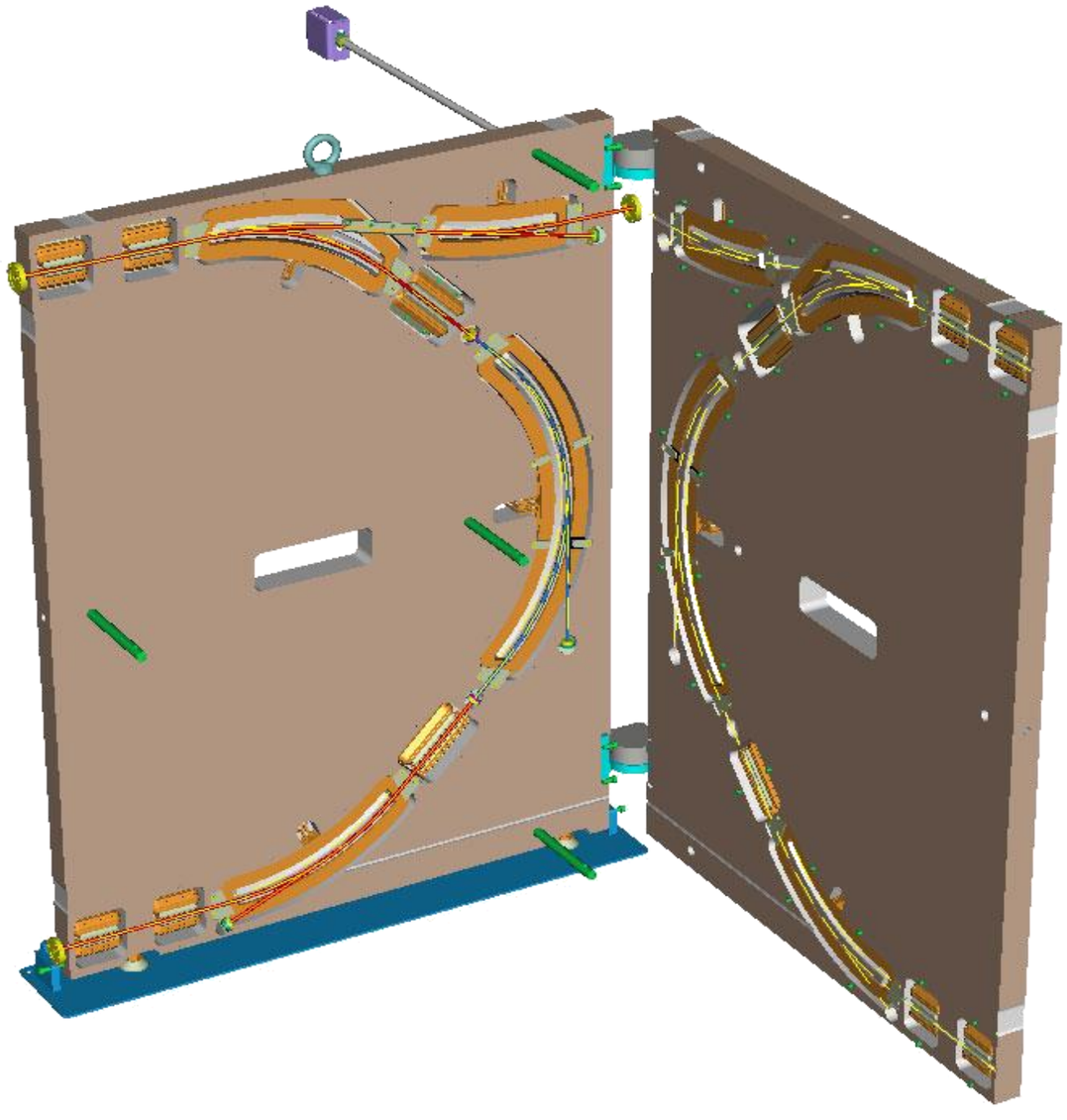


Recirculation



M. Eriksson, IPAC'14

180 degrees bends



Two 5 m LINACs give 500 MeV using the SLED technique and a recirculator.

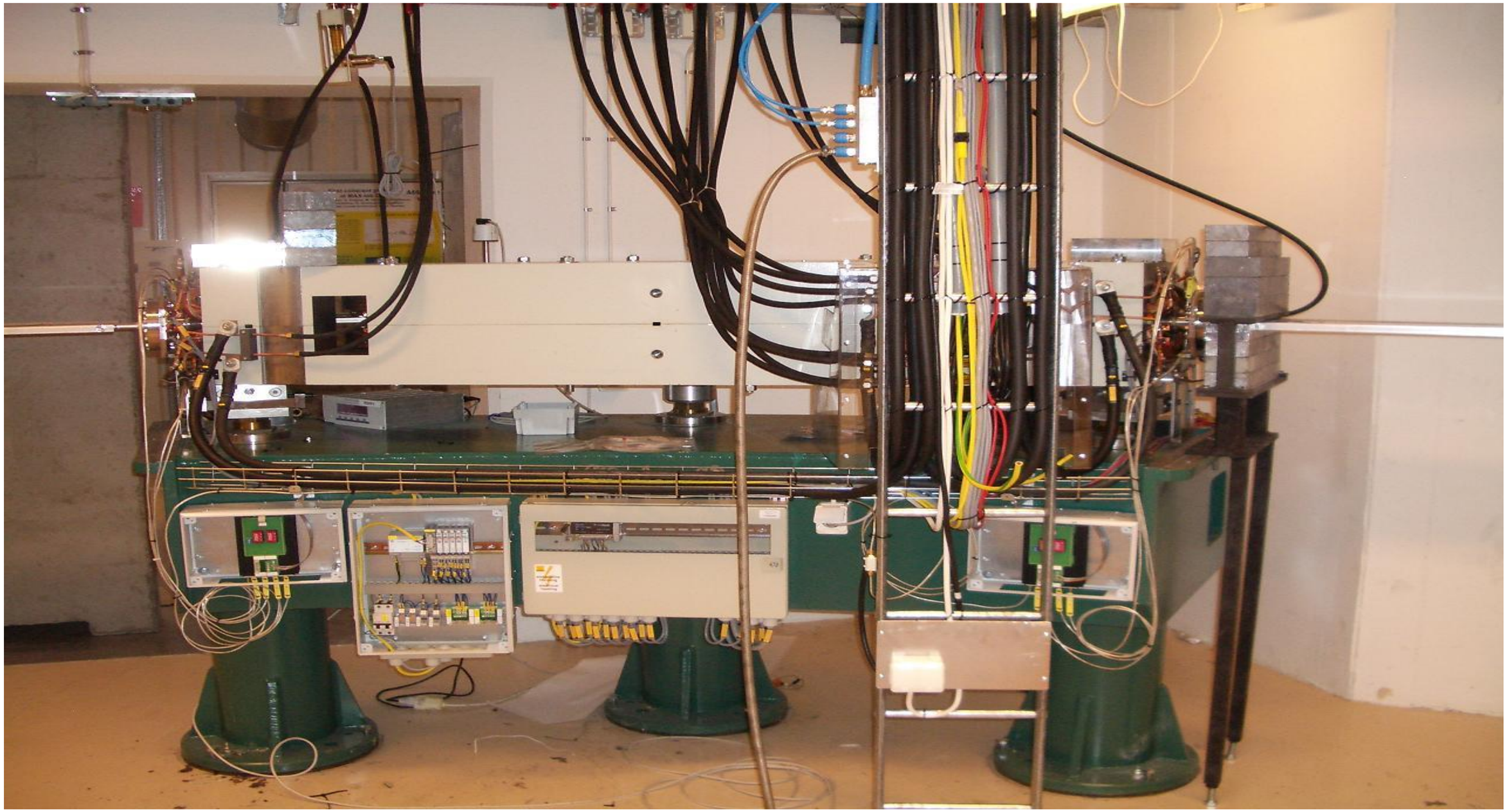
- Replacement of aging 100 MeV microtron
- Decoupled injection into all storage rings
- Possibility to use the LINAC for FEL research
- Higher energy regim for nuclear research

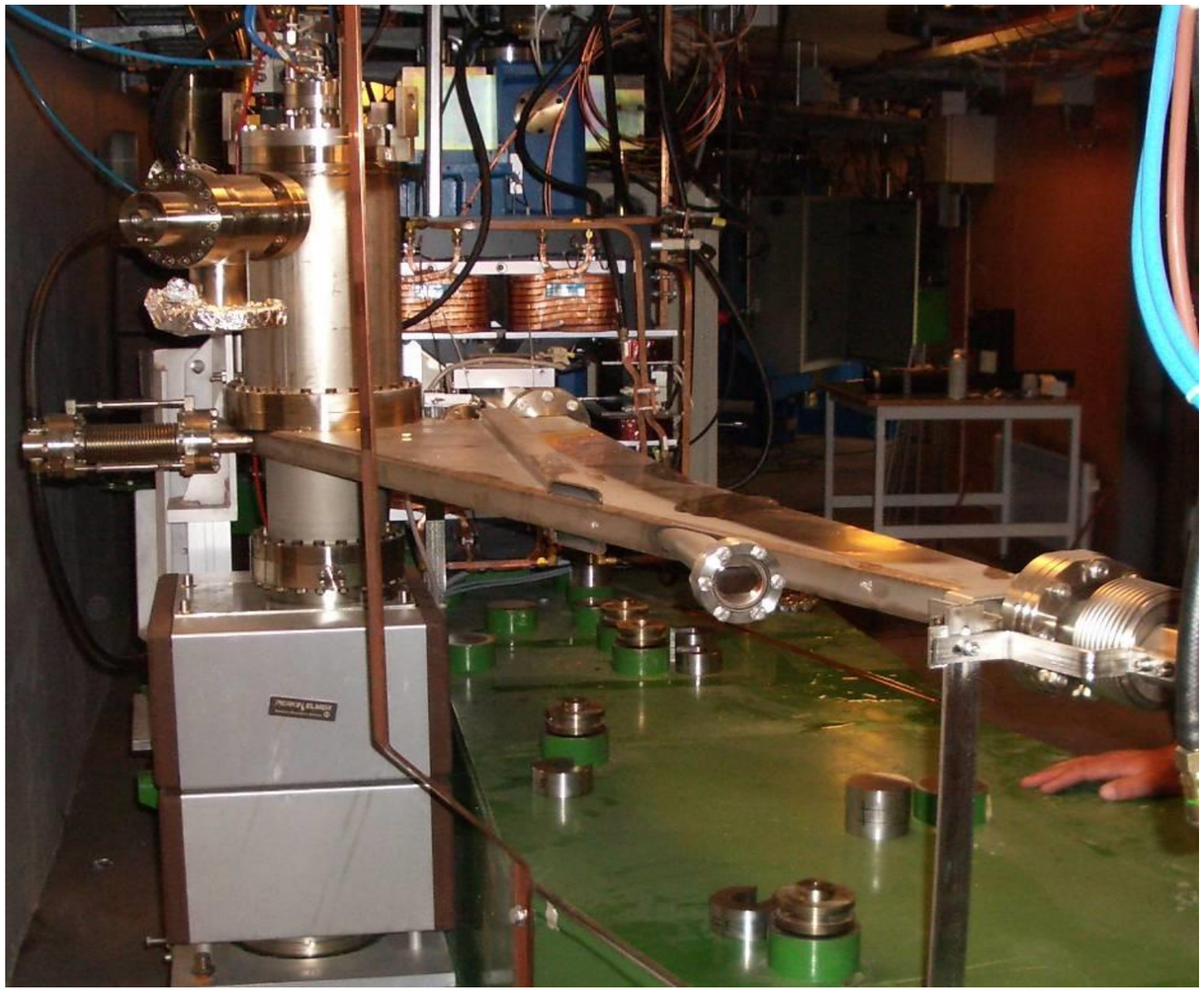
M. Eriksson, IPAC'14

MAX III Magnet Technology

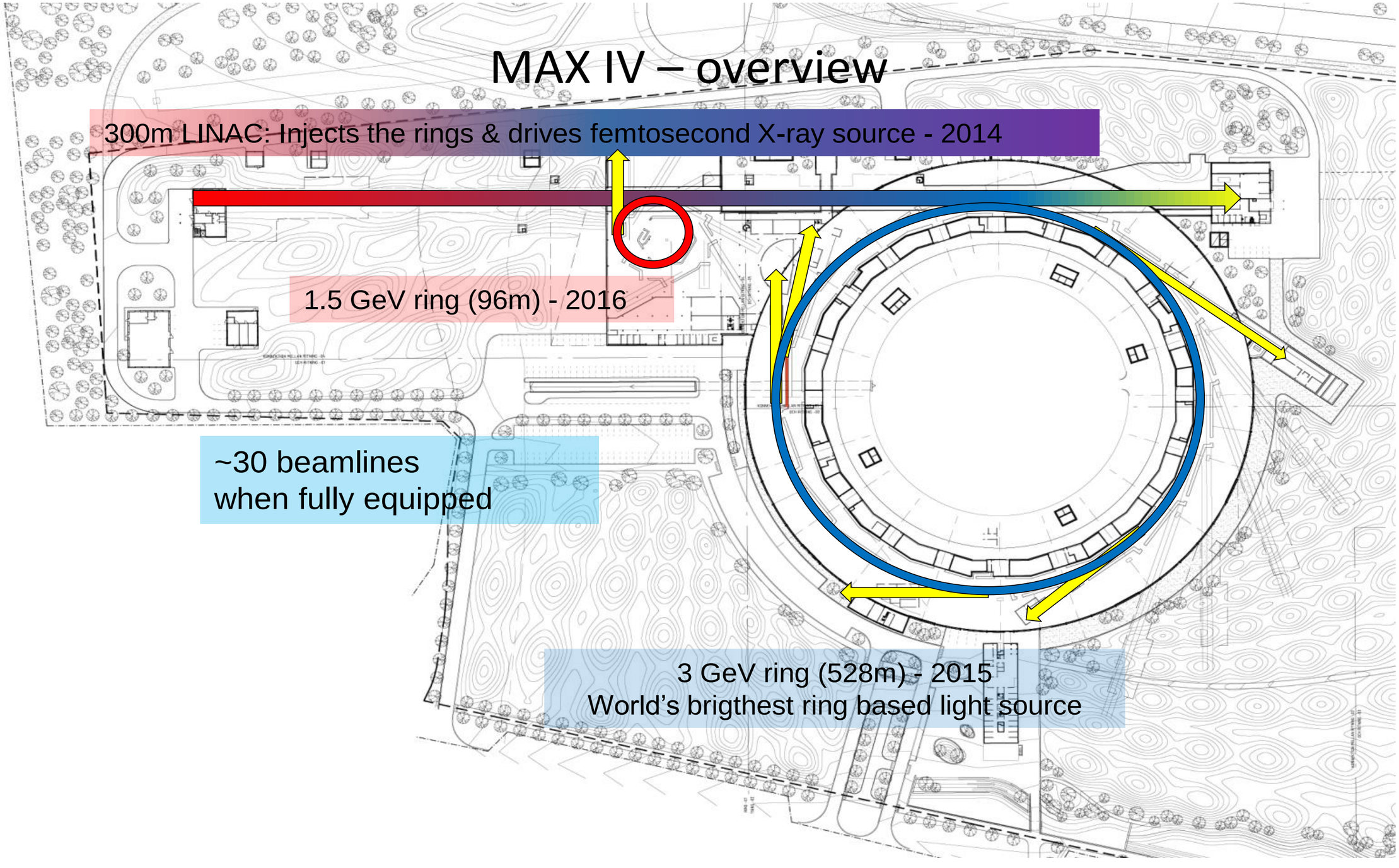
M. Eriksson, IPAC’14

MAX III cell

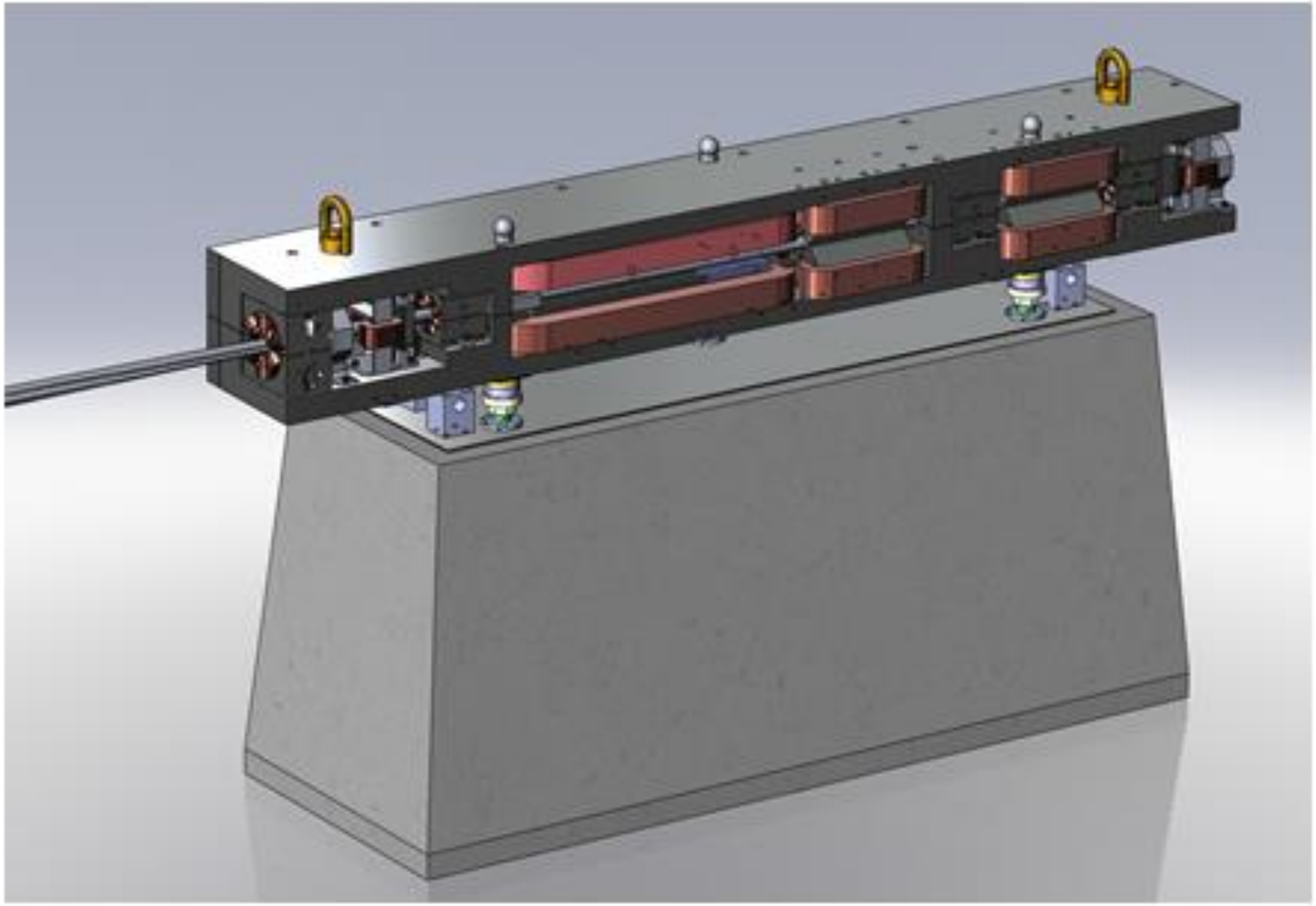


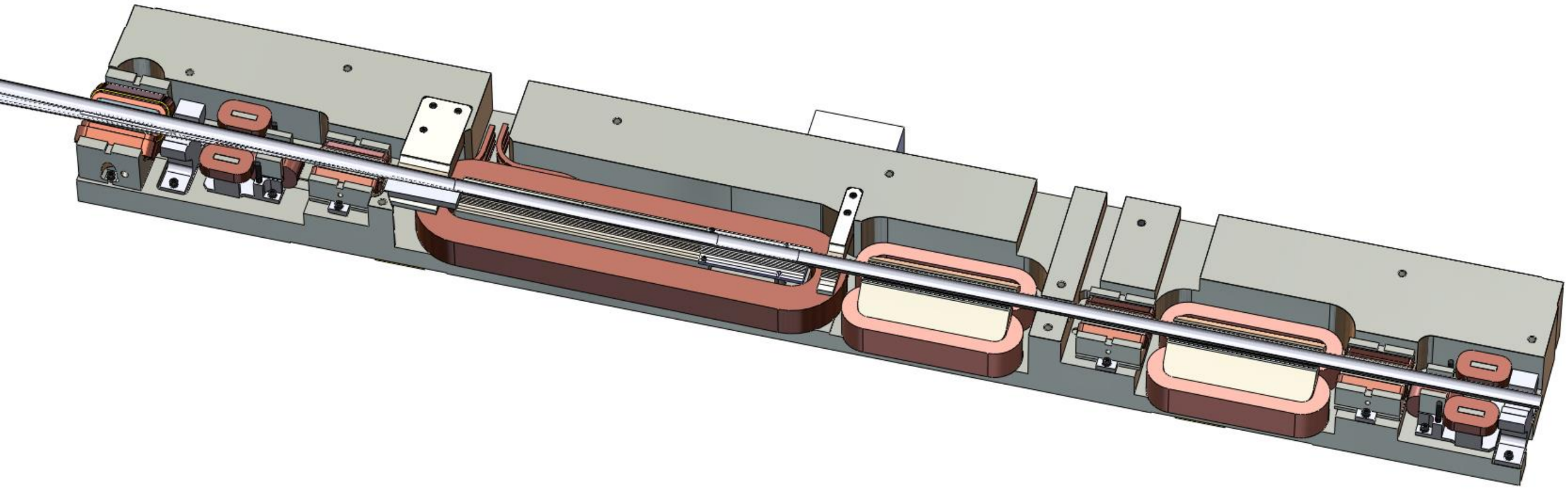


MAX IV – overview

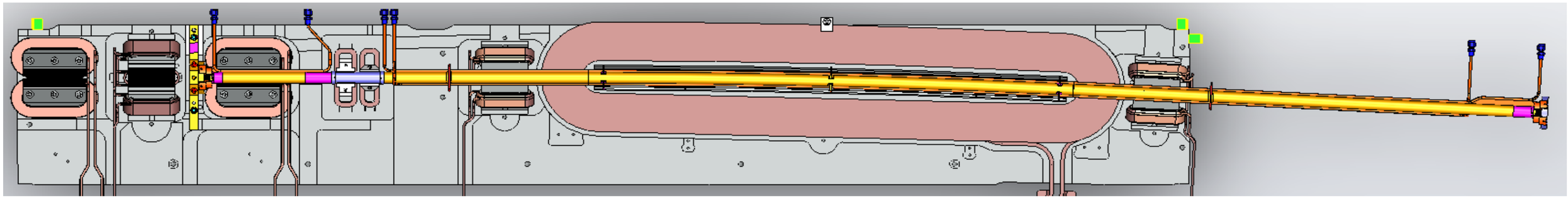


M. Eriksson, IPAC'14

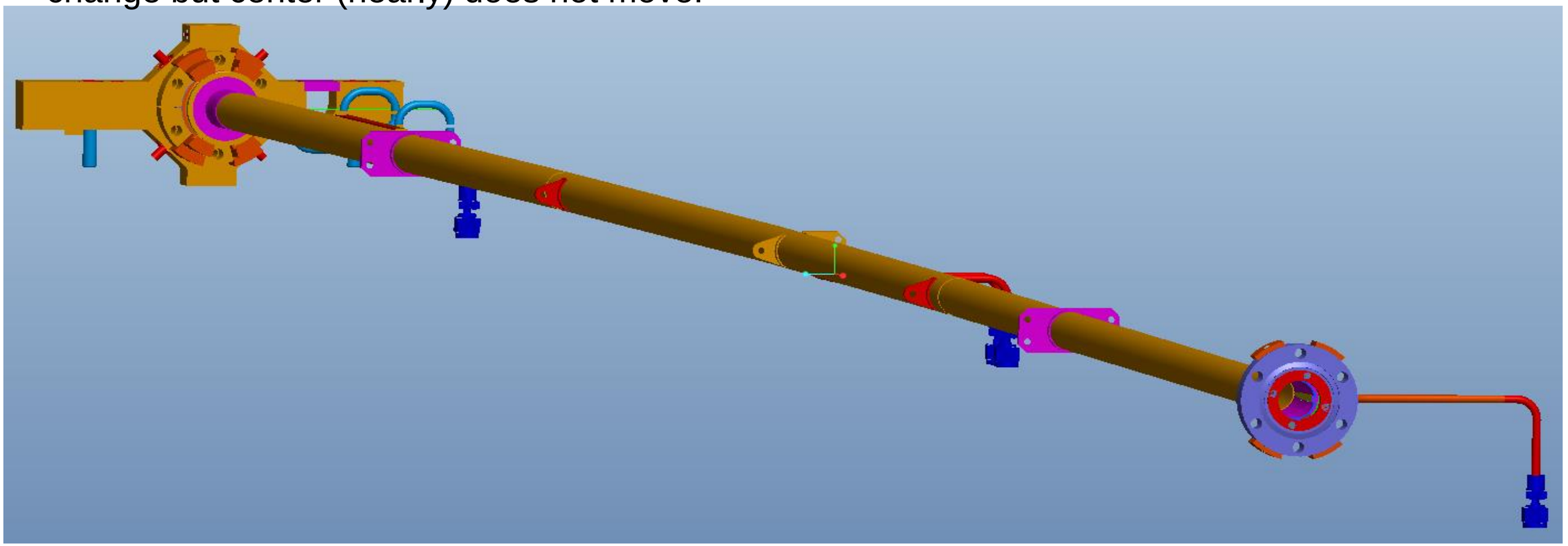




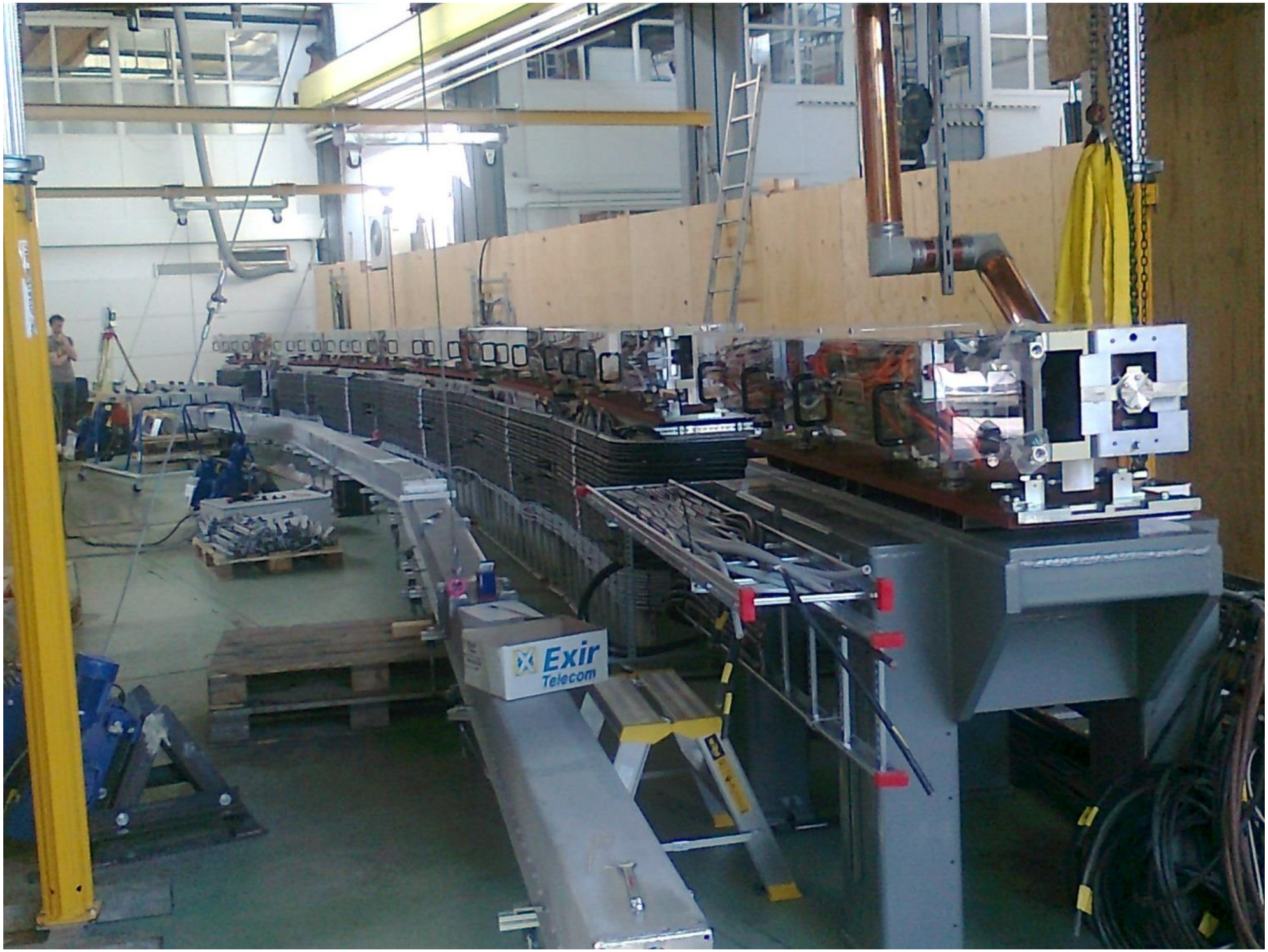
Vacuum chamber



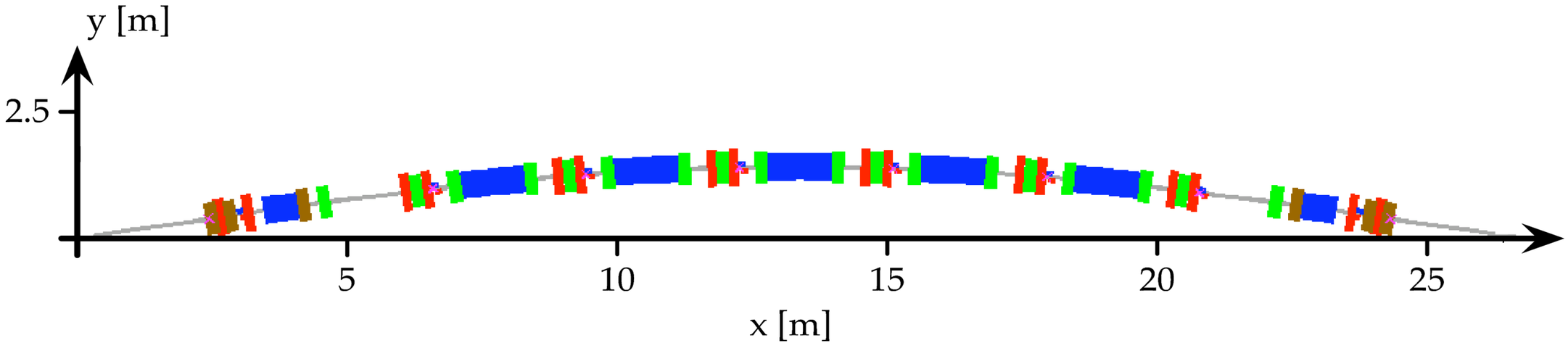
- BPM Bodies fixed to the Blocks.
- Geometry is as symmetrical as possible – if heat load changes , dimensions change but center (nearly) does not move.




Sect. 4
End
Första hjälpen


Exir
Telecom

Multi Bend Achromat Light Sources
Plans presented at the USR workshop
Beijing Sept-Nov 2012



	Energy (GeV)	Circumference (m)	Emittance (H/V) (pm rad)	Current (A)	Planned operation
MAX IV SWE)	3	528	300/8	0.5	2016
PEP-X (USA)	4.5	2199	12/12	0.2	?
Tevatron (USA)	9	6210	3/?	?	?
APS (USA)	6	1060	147/?	0.3	?
Diamond (UK)	3	562	140/?, 45/?, 400/?	?	?
Sirius (Brazil)	3	518	280/?	0.5	2017
ESRF Europe)	6	844	130/?	?	2019
BAPS (China)	5	1365	51/?	0.1->0.15	?

M. Eriksson, IPAC’14

MAX staff so lean MAX IV can not be built without the

Help from Friends:

- Solaris (Krakow)
- BINP (Installation),
- CLS (Modeling, comissioning)
- ESRF (NEG-coating)
- CERN (NEG-coating)
- SLS, NSLS II (modeling)
- ALBA (vac)
- Soleil (Collective instabilities)
- SLAC (advices)
- ……

more to come at comissioning.

END