



ESRF Status

P. Elleaume

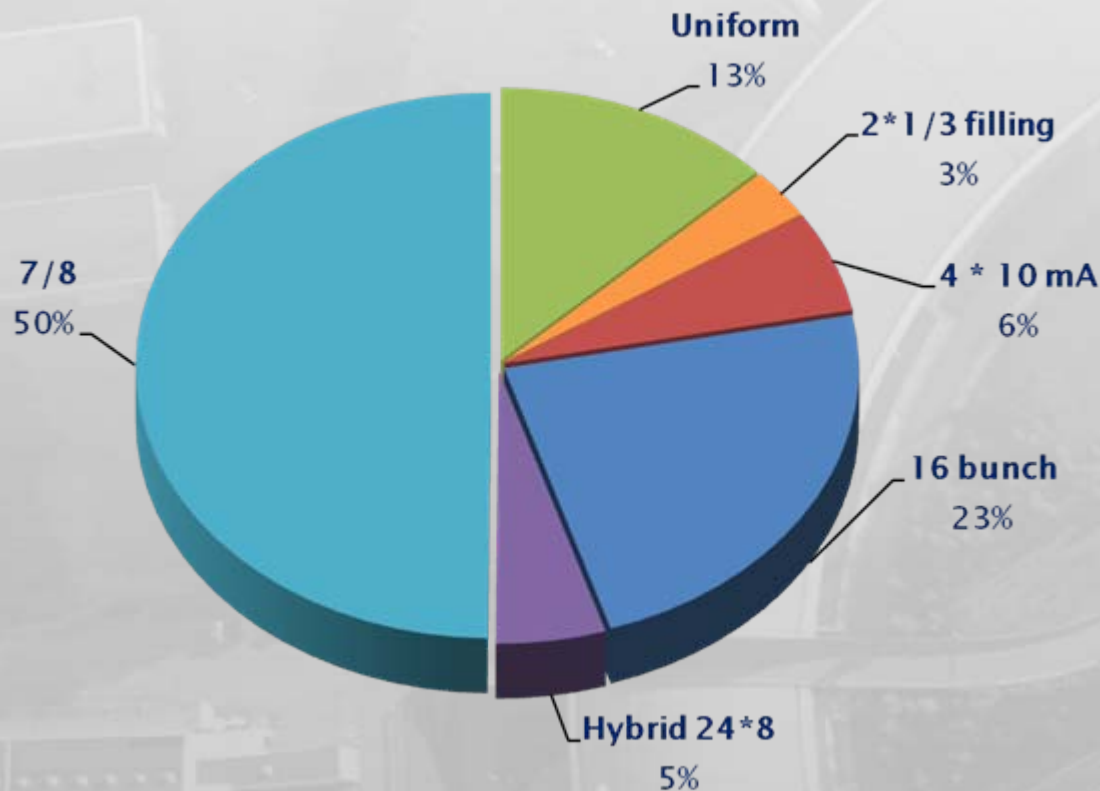
Machine Statistics for 2007-2009

	2007	2008	2009 [*]
Availability (%)	97.8	98.3	99.03
Mean time between failures (hrs)	56.8	64.5	78.1
Mean duration of a failure (hrs)	1.2	1.1	0.8

(* Until 23 November 2009)

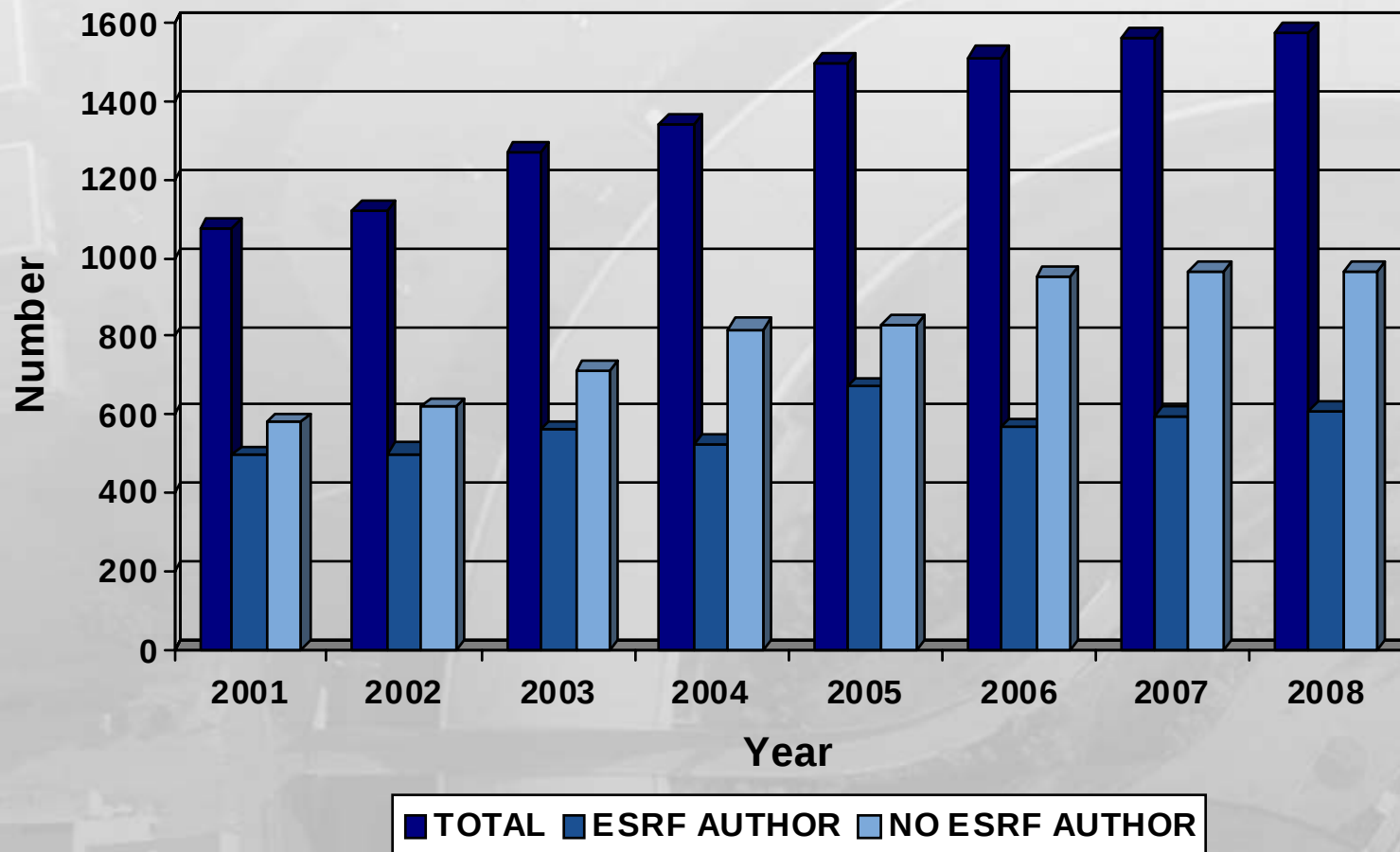
FILLING MODES

2009

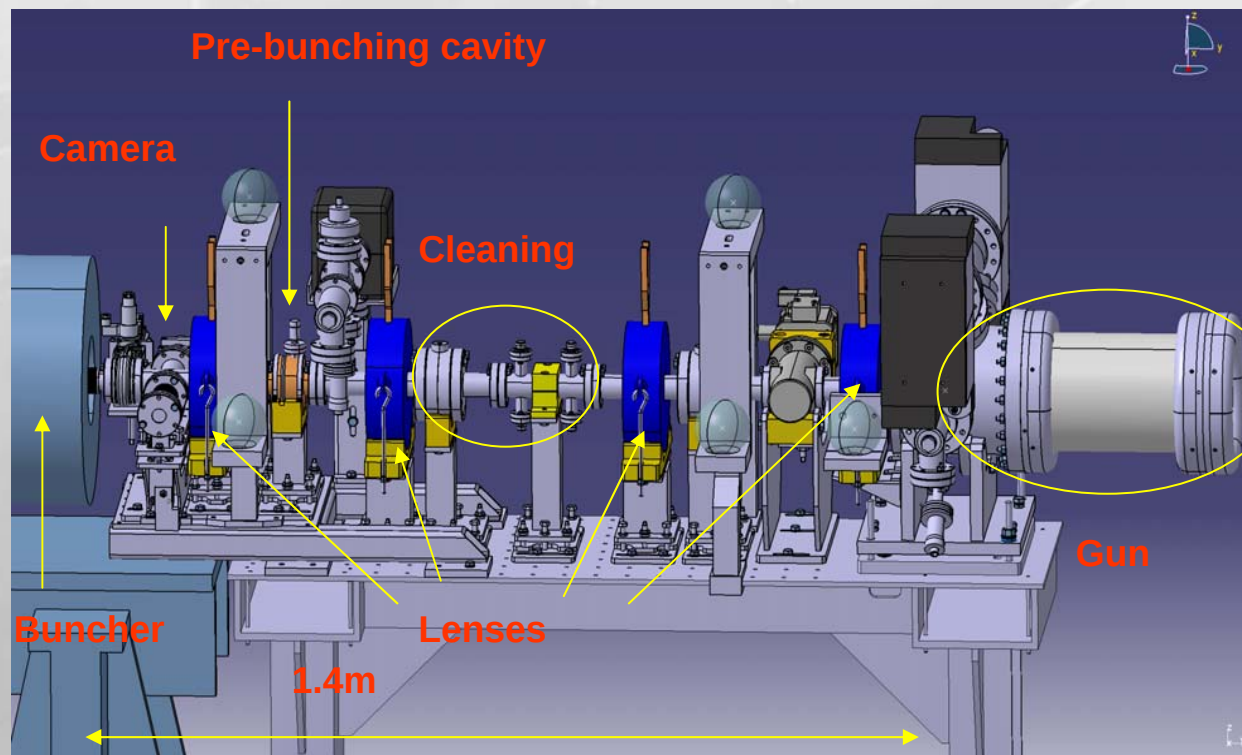


User Time : 5640 h
Machine Time : 1296 h
Shutdown : 1824 h

Refereed Scientific Publications from work at the ESRF



New Linac Gun and transfer line (based on CLIO-SOLEIL Design)



Motivations :

- Obsolete cathodes
- Higher capture
- Bunch purity ($\times 10^4$)

Operation since
August 2009

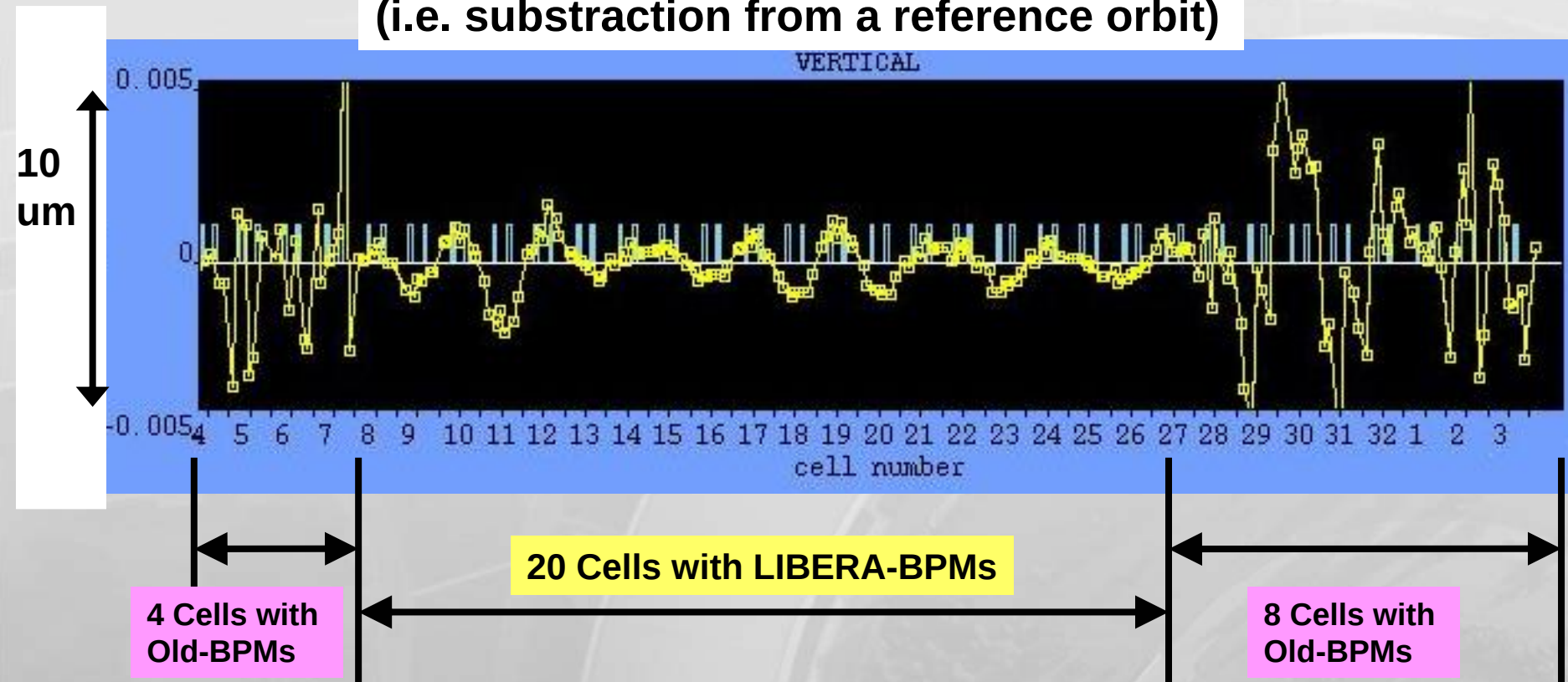
New Electron Beam Position Measurement System

224 Libera Brilliance (32 cells x 7 stations) in operation since March 2009

- Orbit Measurement and slow Orbit Correction
- T-b-T capability has been tested and is close to be fully commissioned
- FA (10KHz) distribution is in commissioning



Orbit measurement repeatability (i.e. subtraction from a reference orbit)



7 cells had been done BEFORE Winter shut-down (in 3 MDTs)
 13 cells were done DURING Winter shut-down
 12 more cells were done AFTER Winter shut-down (in 4 MDTs)

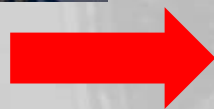
Status of the Bunch by bunch Feedback

- **Longitudinal**
 - In operation in uniform
 - Required for 300 mA operation
- **Vertical**
 - In operation in uniform filling (ion trapping)
 - Will be used in 7/8 filling pattern (single bunch current from 2.5 to 5 mA with multibunch chromaticity)
 - Will be used as diagnostic tool
 - Tune monitoring
 - Coupled bunch mode analysis

Council approval of the Upgrade Programme 2009-2016



Experimental Hall Extension (EX2)



From Klystron to Solid State RF Amplifiers

- No High Voltage
- No X rays
- 20 dB less phase noise
- Modularity , built-in redundancy
- Easy maintenance
- Good experience at SOLEIL
- Likely to become the new standard for high power CW RF applications
- Anticipate a possible obsolescence of high power klystrons (small market)

Upgrade of the 352.2 MHz RF system

Existing Operation at 200 mA

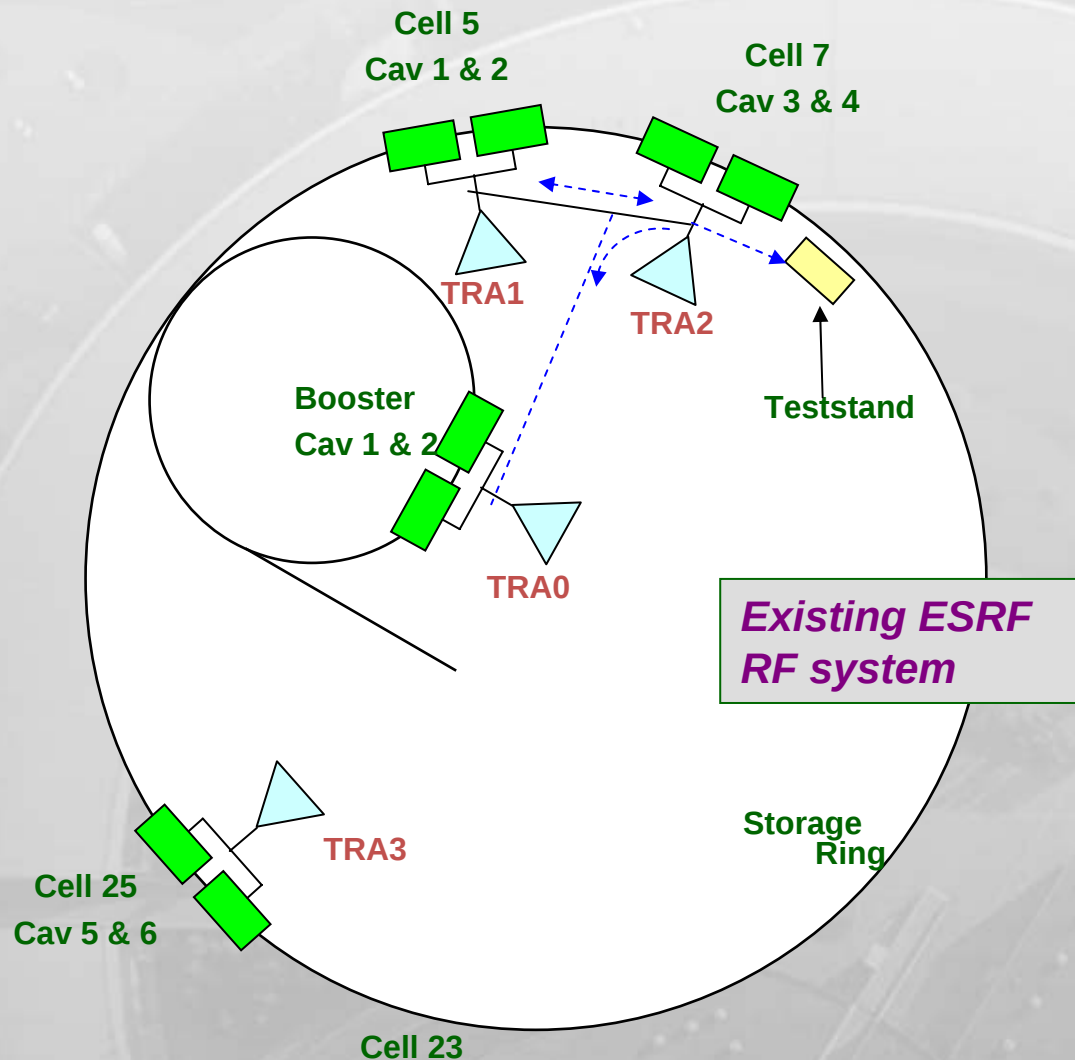
- 1.3 MW klystron transmitters: Redundancy in case of any transmitter failure (waveguide switching)
- Suppression of HOM driven Longitudinal Coupled Bunch Instabilities by Cavity Temperature regulation

Current upgrade to 300 mA

- No transmitter redundancy
- Need Longitudinal feedback to stabilize HOM driven instabilities
- Increased voltage to master Robinson Instability

Long term

- Only 1 klystron manufacturer left, possible of stability and obsolescence



Order of 7 x 150 kW of Solid State Amplifiers from ELTA

Technical design derived from SOLEIL

New transistors allow a more compact design with only **2 towers** to obtain **2 x 75 kW**

Contract includes :

- 4 x 150 kW SSA for the booster
- 3 x 150 kW SSA for the SR

First 75 kW tower built in close collaboration between SOLEIL and ELTA

A functional acceptance test of the 1st tower will be performed at SOLEIL

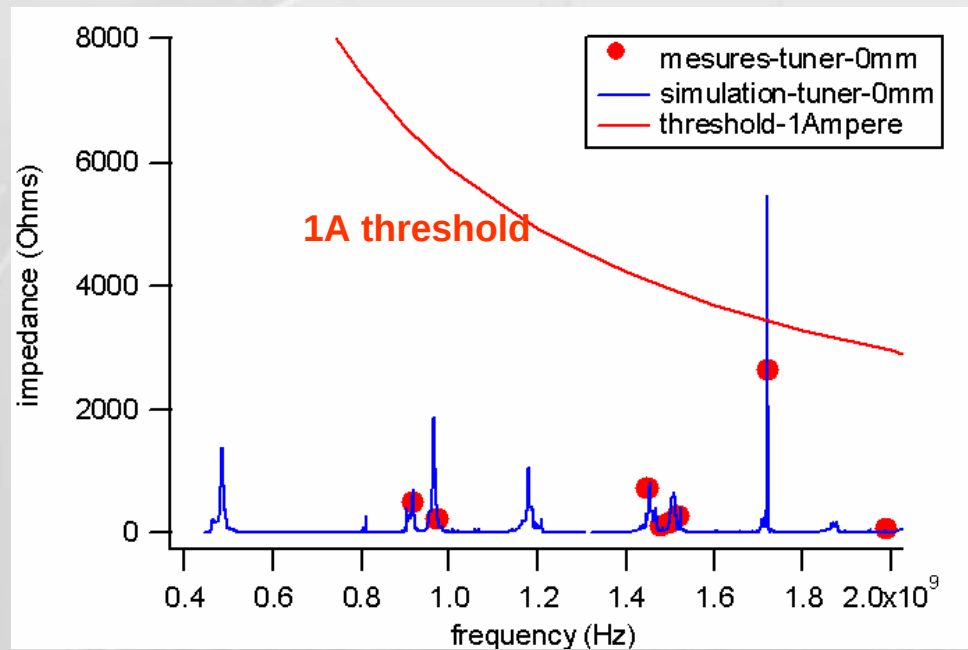
A 1000 h run test will then be carried out at ESRF



Single cell Normal Conducting HOM damped cavity

Design study terminated in January 2009

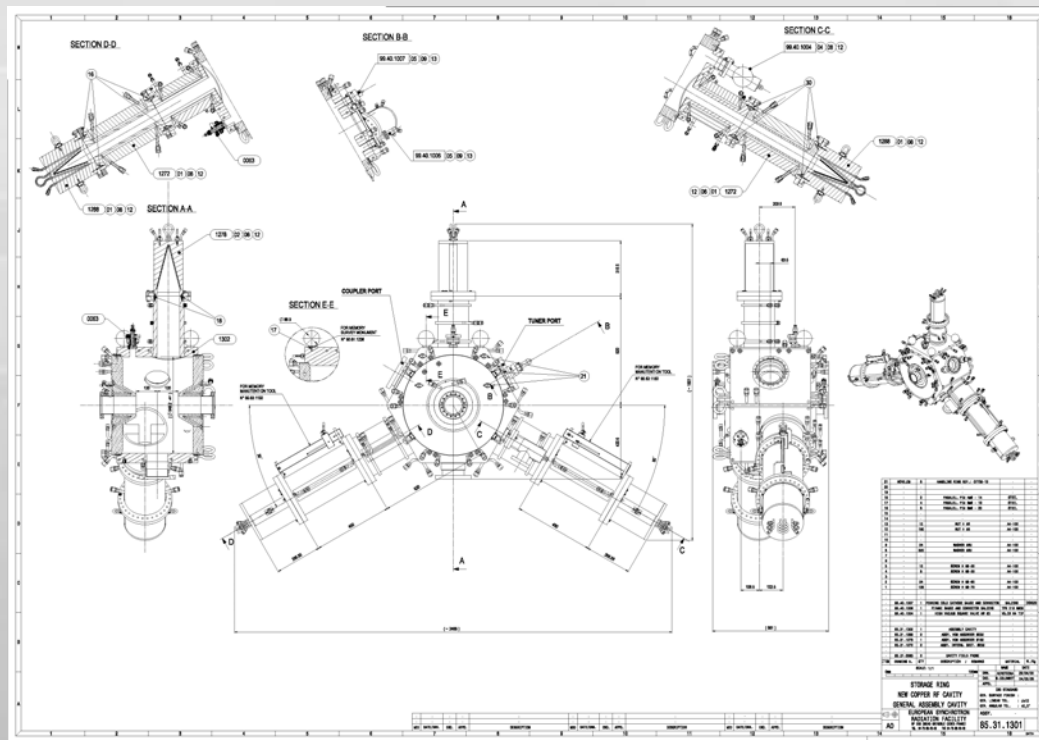
Aluminium model



All the HOM impedances are well below the threshold of 1A / 18 cavities

⇒ R&D based on BESSY design with ferrite loaded ridge waveguides for selective HOM damping

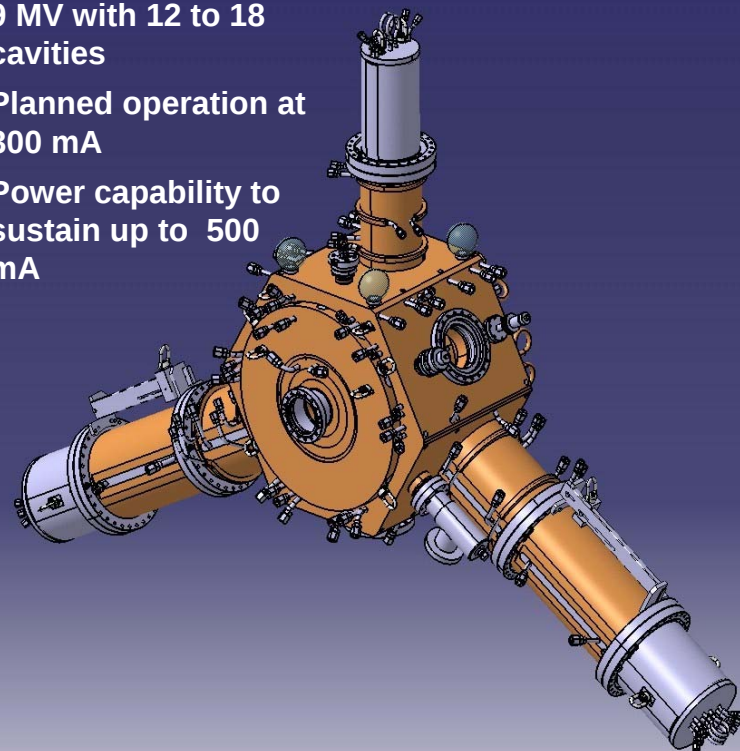
HOM damped cavity prototype



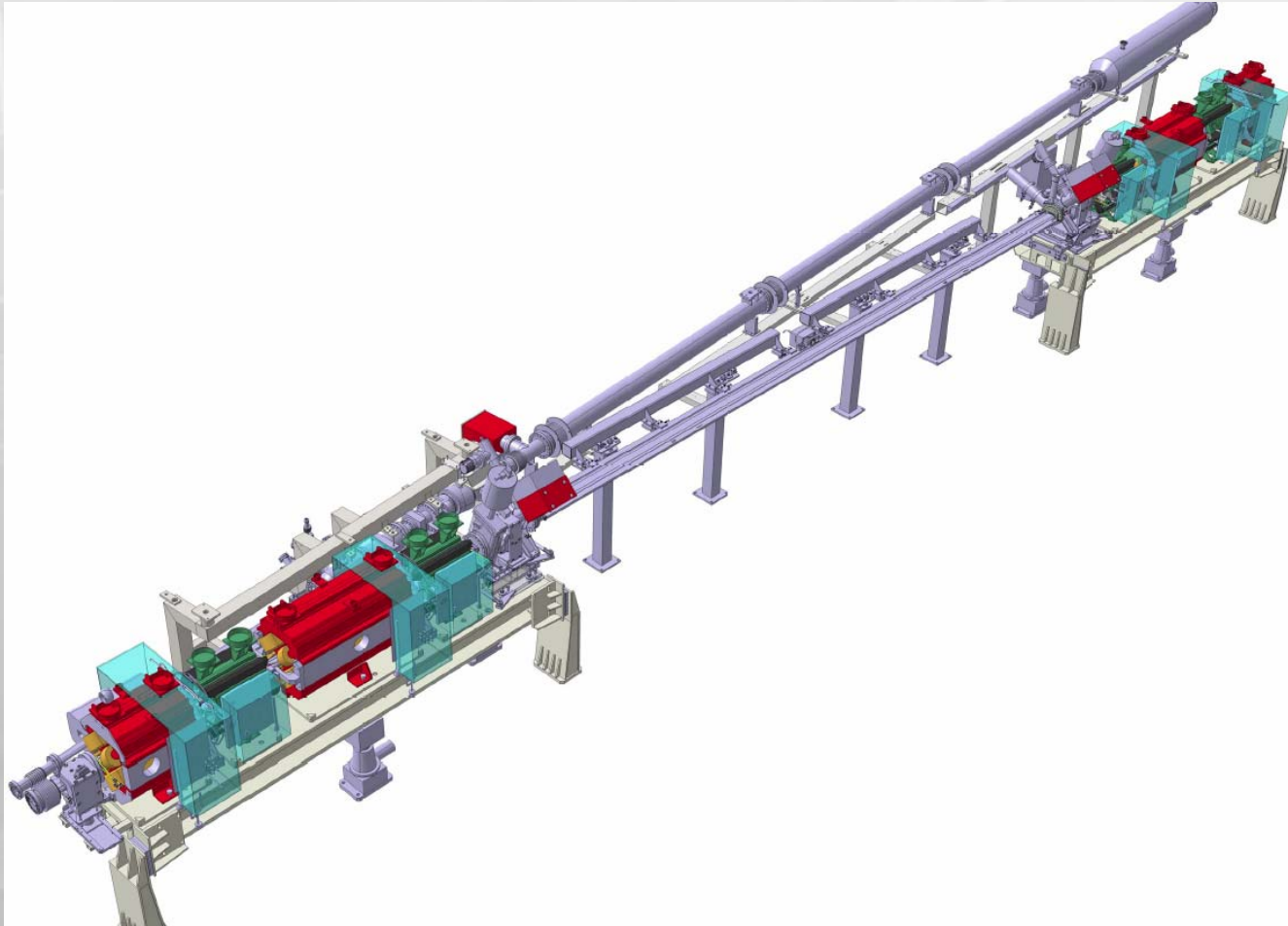
Detailed mechanical design by ESRF
 Ordered three prototypes
 - Research Instruments, Cinel, Sdms

- ➡ Validate the design
- ➡ Validate the manufacturing procedure
- ➡ Obtain operational cavity

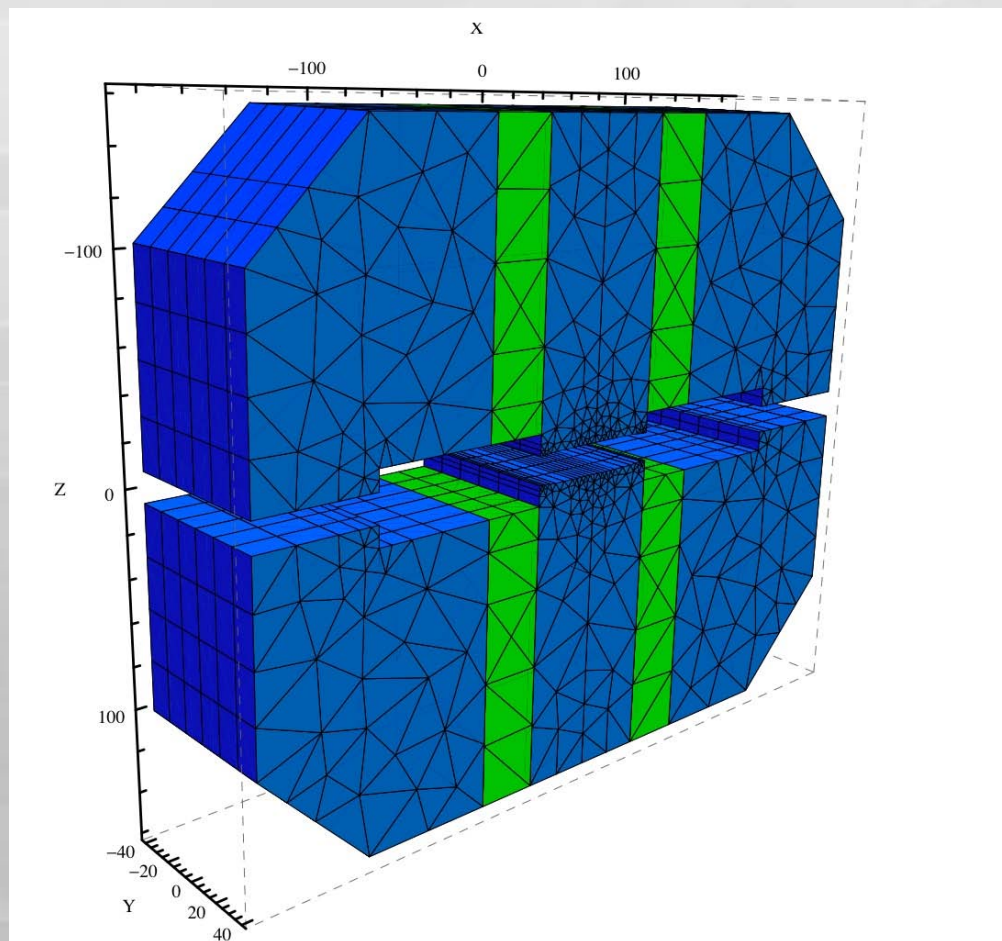
- 9 MV with 12 to 18 cavities
- Planned operation at 300 mA
- Power capability to sustain up to 500 mA



5 -> 6 m Insertion Device straight Section

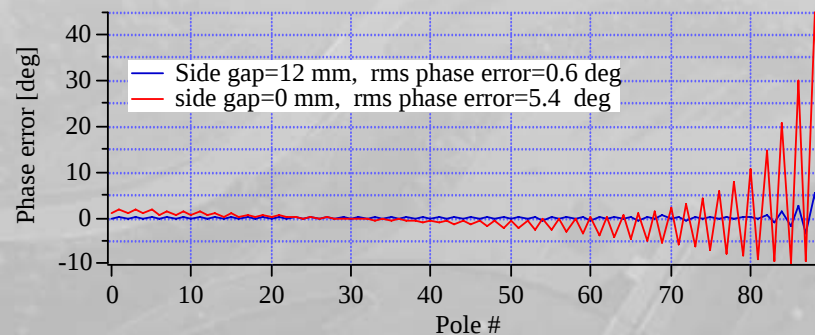
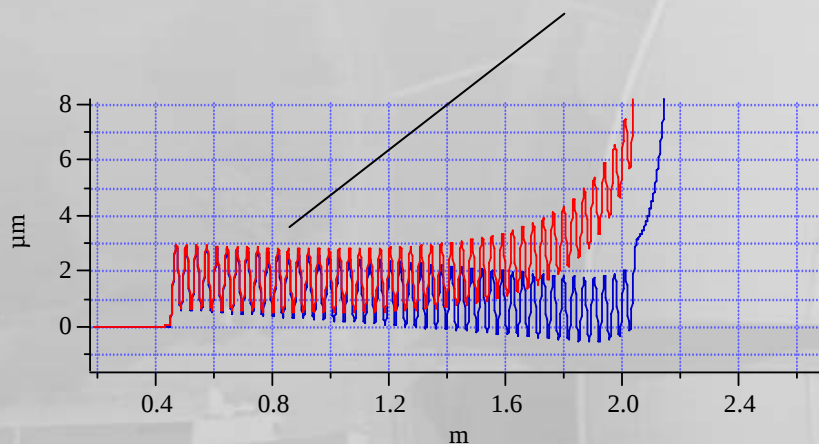
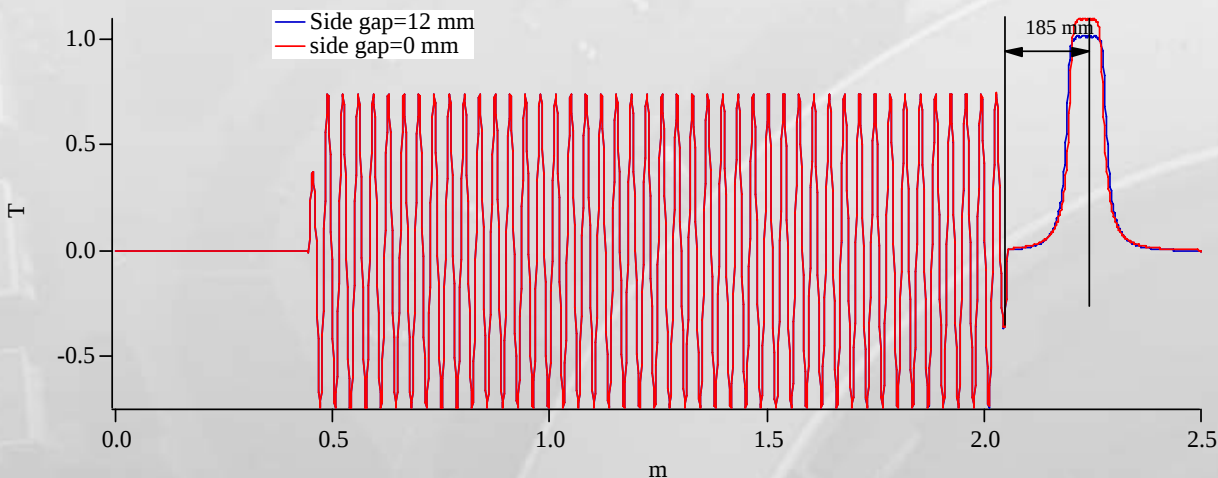


Permanent Magnet Steerer for Canted ID Straight Sections



- Flat field Profile $B_z(x)$ for large dynamic aperture
- Short Range Fringe Field
- Minimize field interference with adjacent undulators

Interference with undulator field



Developments over next 7 years

- Solid State Amplifiers
- HOM Damped RF Cavities
- New Fast Orbit correction system
- 6m and 7m ID Vacuum Chambers
- New Insertion devices
 - Revolver Undulators
 - 2.5 m in-vacuum undulators
 - CPMU
- Canted Straight sections
- Topping-up Capabilities in timing modes
- 300 mA Operation
- A number of other refurbishments
- **Maintain Continuous and Reliable Operation !!**

