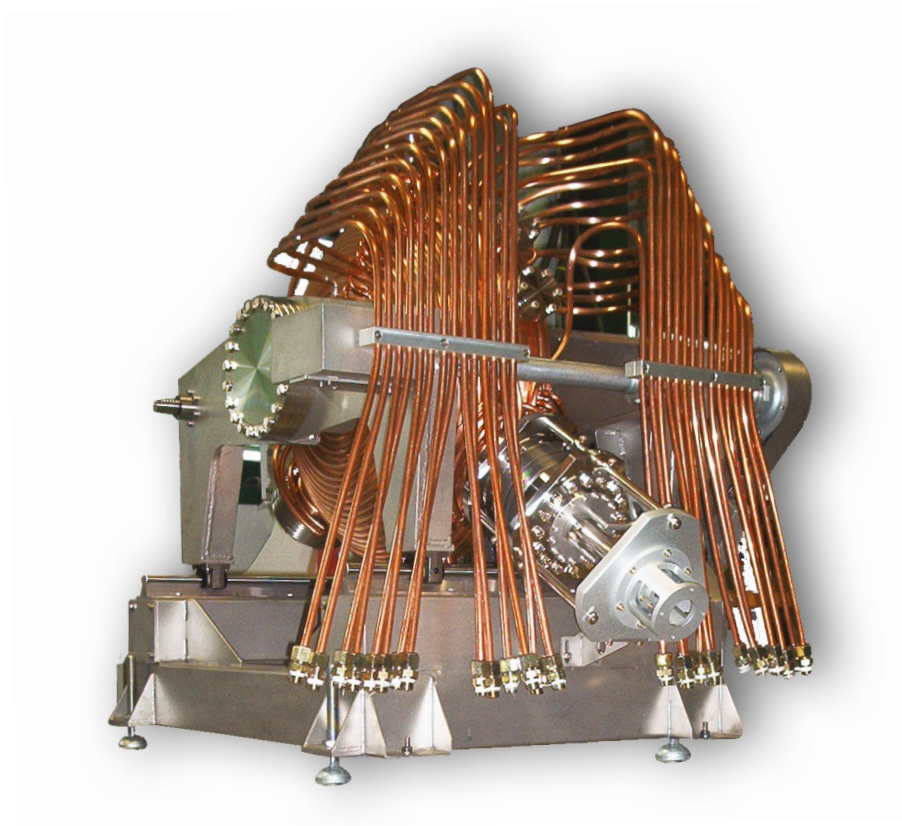


Elettra Type RF Cavities

500 MHz single cell normal conducting accelerating cavity



Highlights

Feature	Benefit
Single cell cavity	Fit short section with high acceleration efficiency
Normal conducting copper cavity	Easy to operate and fast switch on/off procedure
High purity (99.99%), high conductivity and oxygen free copper	Designed to operate in Ultra High Vacuum (UHV) environment
Elliptical inner profile	Free from multi-pacting phenomena and reduces the amount of trapped High Order Modes
Two separate cooling channels	Allows for a very precise reference temperature set to tune the High Order Mode Frequency Spectrum (HOMs)
Three equatorial large ports	To host the input power coupler, the HOMs Frequency Shifter and vacuum pump
Five equatorial small ports	To host RF pick up to control and monitor the RF signal

How Does It Work?

Radiofrequency (RF) cavities provide the accelerating voltage and power to accelerate and restore the energy lost by the beam owing to the radiation in the storage ring, establishing a 500 MHz electromagnetic field synchronous with the electron beam passage.

The radiofrequency power is fed into the cavity via the coaxial type input power coupler, designed to operate in a UHV environment. The coupling coefficient can be adjusted simply by means of a swivel flange.

A set of pick-ups is provided to monitor the RF fields inside the cavity for low level control electronics and measurement purposes.



Power coupler

The cavity and coupler are water cooled. Besides extracting the RF power dissipated in the cavity, this also allows for tight regulation of the external surface temperature and within a wide range. A typical cavity temperature stability of $\pm 0.05^\circ\text{C}$ within a temperature range from 35 to 80 $^\circ\text{C}$ can be achieved by means of a dedicated cooling rack.

The cavity volume is then fixed by this precise temperature control and stability, leading to the capability to set the proper HOM frequency spectrum together with a movable plunger (HOMFS).



Cooling rack

Specifications

Resonating frequency	500 MHz
Shunt impedance	$> 3.3 \text{ M}\Omega$
Quality factor	$> 39\,000$
Peak accelerating voltage	650 kV
Power wasted in the cavity	$< 65 \text{ kW}$
Maximum power through the coupler	120 kW

Deliverables

- Elettra Type RF Cavity
- **Optional:** dedicated cooling rack for the cavity can be provided
- **Optional:** Low Level RF electronic (frequency, amplitude and phase loops)

