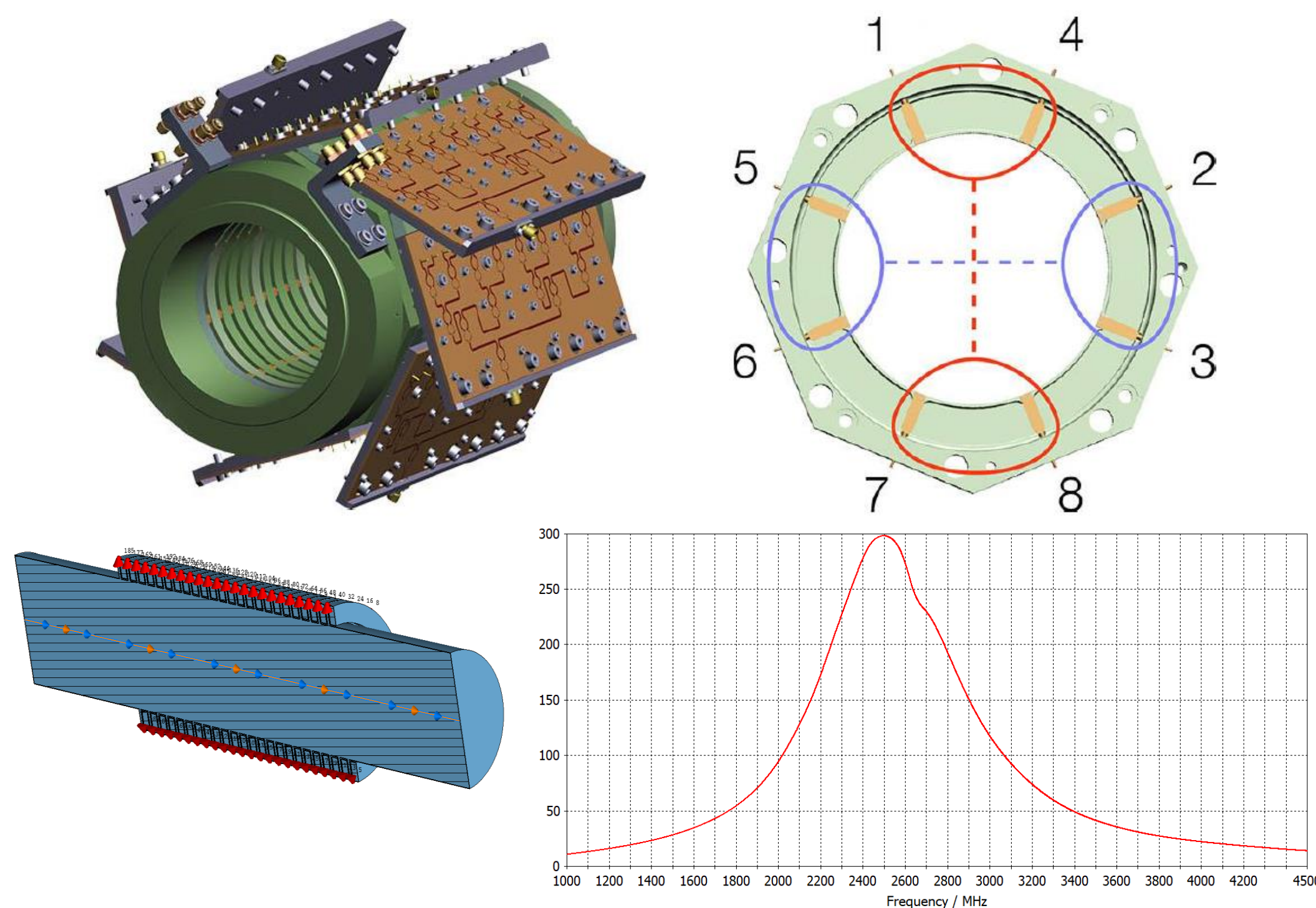


# Design and Optimization of the NICA Longitudinal Stochastic Cooling Pickup/Kicker

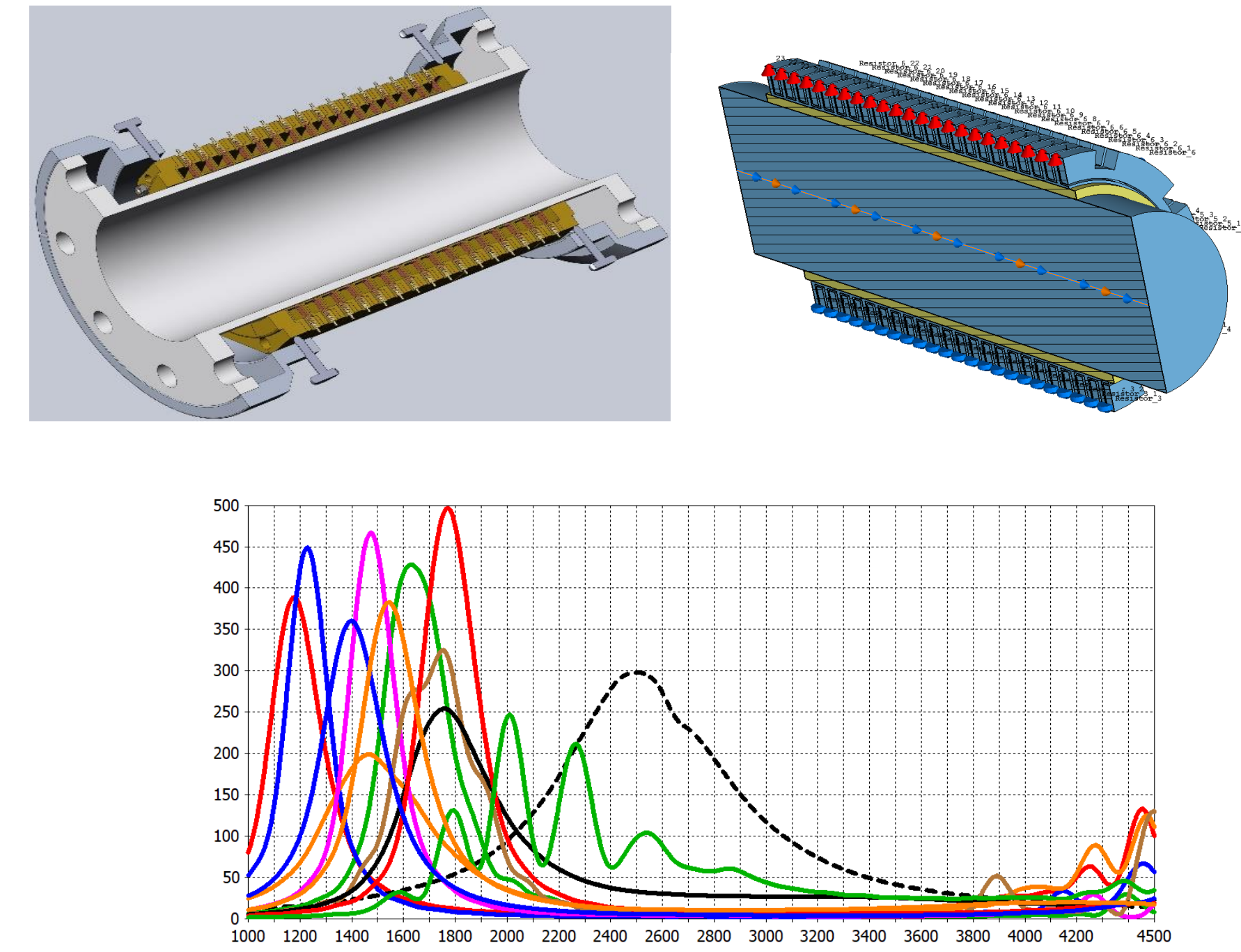
Konstantin Osipov, Vladimir Filimonov, Ivan Gorelyshev, Anatoly Sidorin, JINR, Dubna, Russia

## Initial Design – Ring Slot Coupler (COSY)



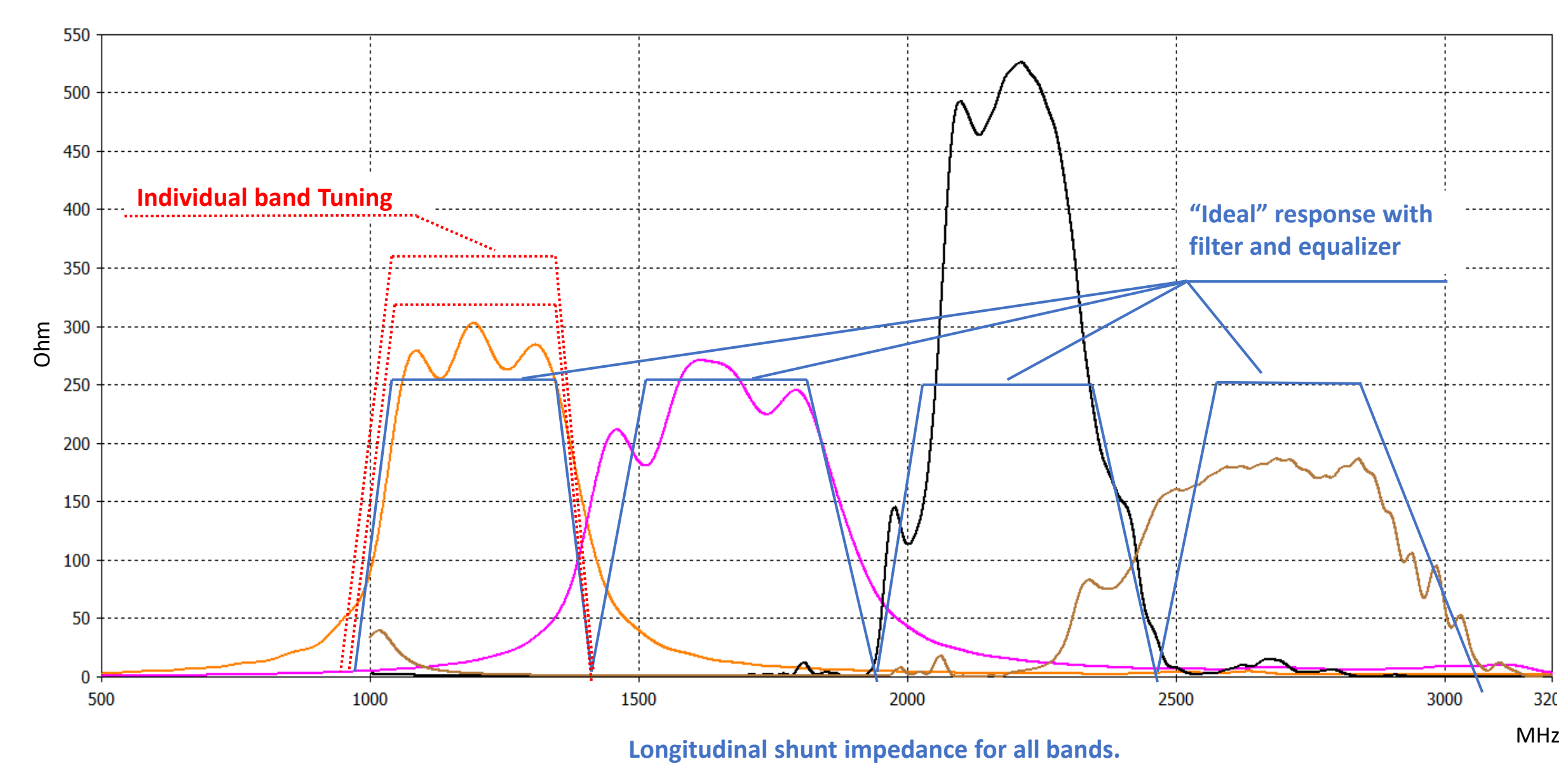
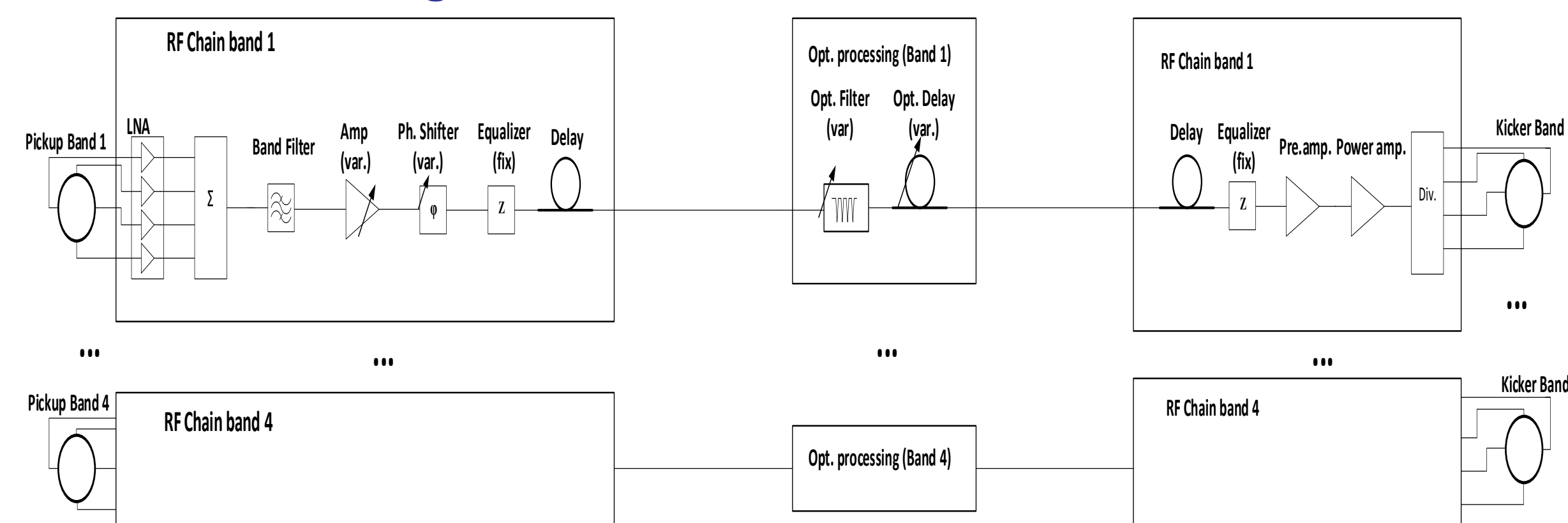
- + Good response:**  
Self-supporting system of ring resonators.  
Biased with shorted stripes and external summing/dividing scheme.
- But:**
1. High sealing volume. 2. Bulky system as a result.
  3. Ultra-High vacuum, need for NICA, cannot be achieved

## Local Sealing with ceramic Tube

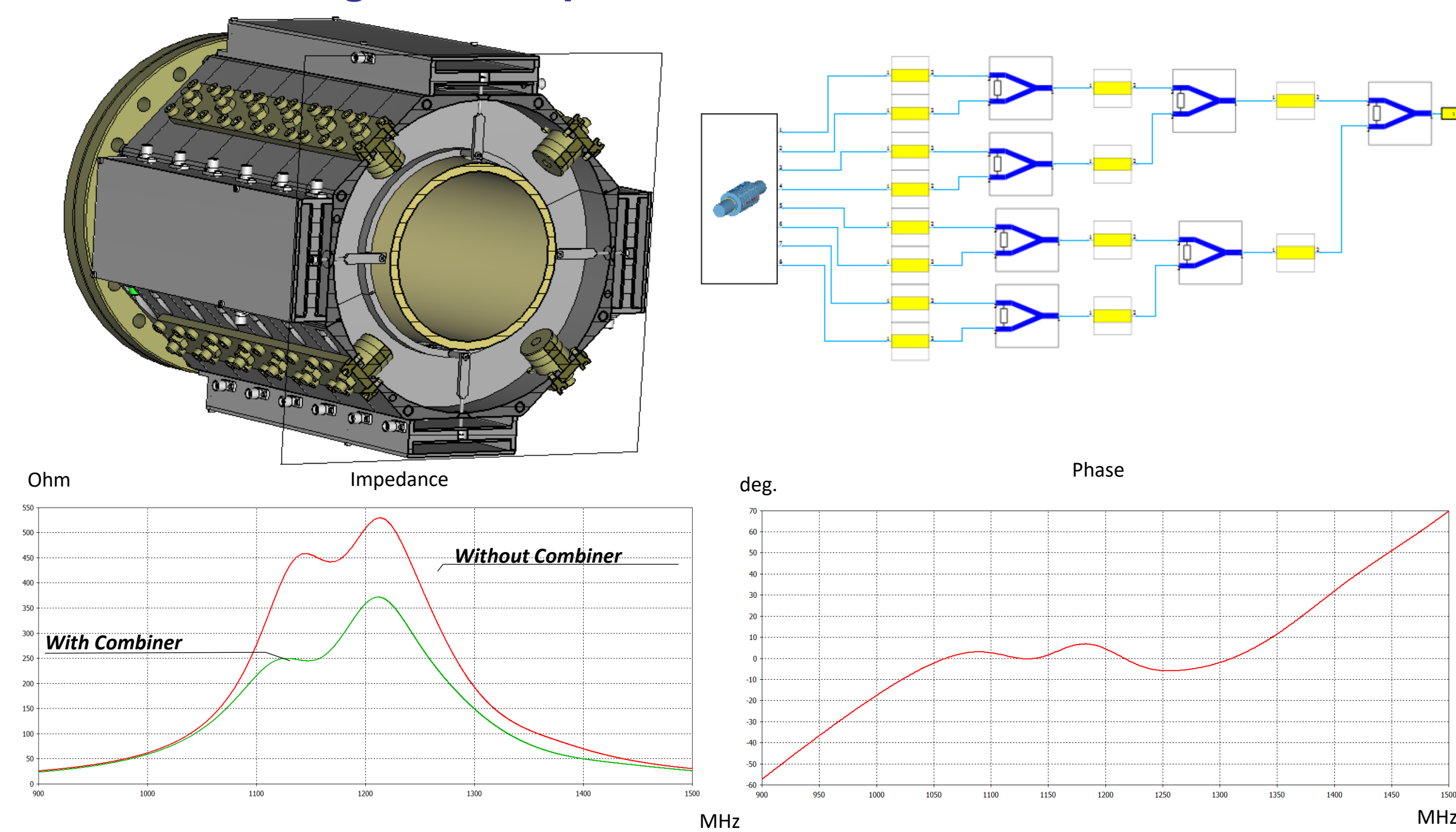


- + Solving sealing problem**  
Using cylindrical ceramic tube is good in solving the problem of local sealing,
- But:**
- high  $\epsilon$  of ceramic (Al<sub>2</sub>O<sub>3</sub>) moves frequency of structure down to 1-1.8 GHz and decrease the bandwidth.
  - So, reasonable parameters can not be reached in required bandwidth.

## Sub-Band Dividing :

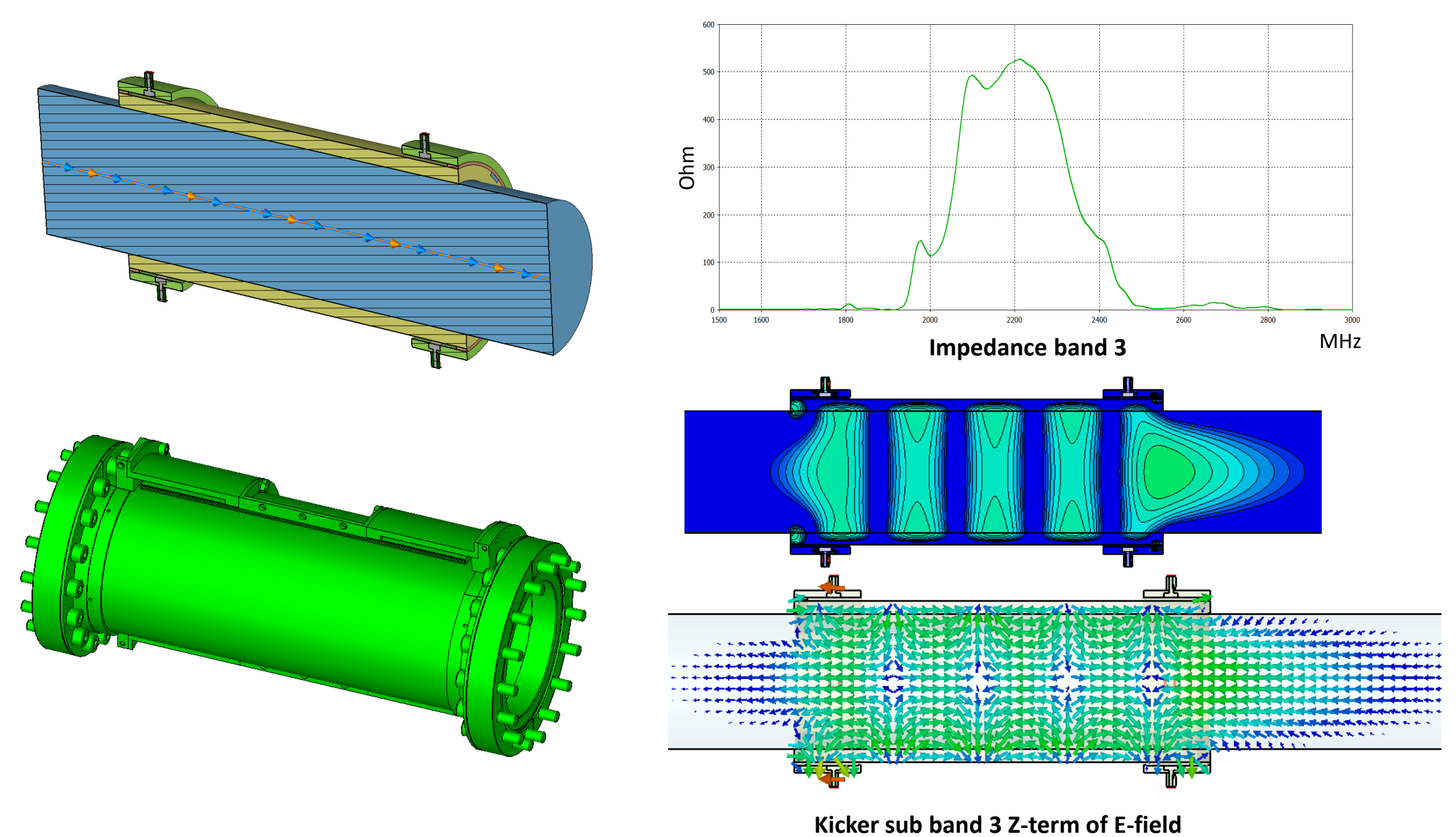


## Modified Ring-Slot Coupler :



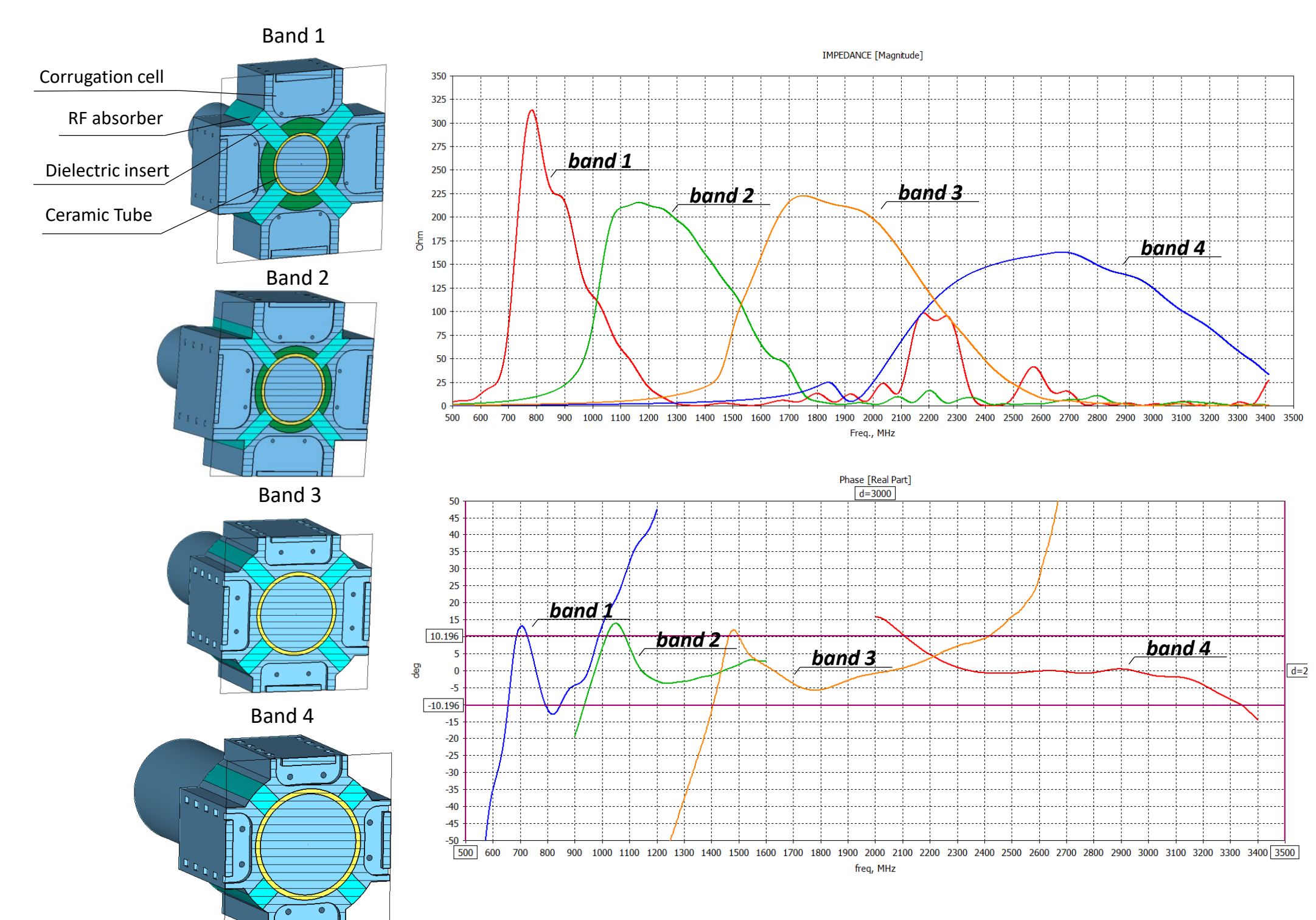
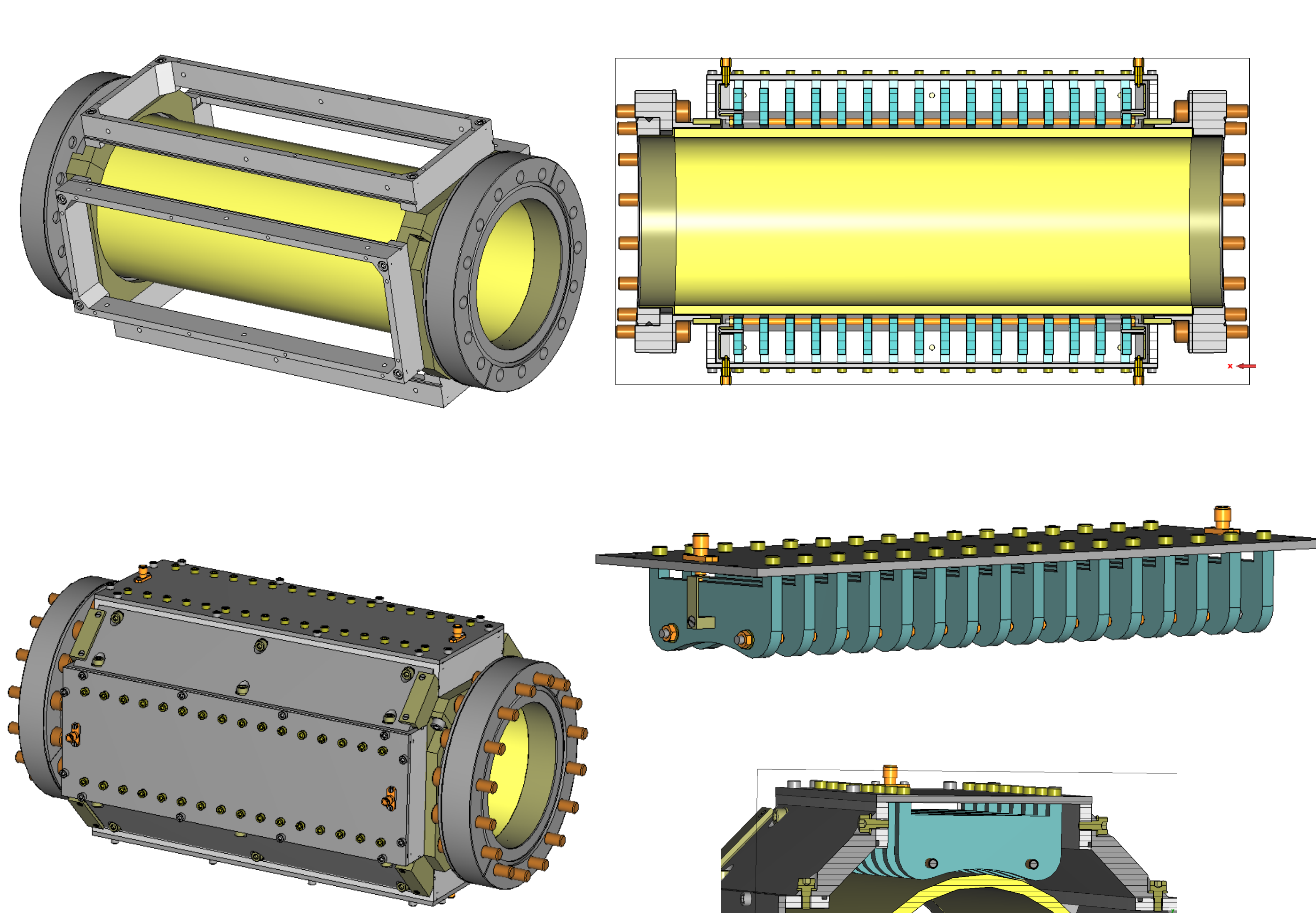
- + Reduced Rings Number (8rings, 4 ports per ring) to reduce combining board losses.**
- But:**
- Design can not be adopted for frequencies higher than 2Ghz.
  - Bulky design.
  - Combining board losses and problems with heat dissipation in combining board

## Surface Wave Cherenkov Pickup:



- + Uses surface wave in dielectric (ceramic tube and dielectric inserts).**
- But:**
- Spikes in Impedance curve
  - Relatively narrow bandwidth.
  - Does not work on low frequencies.

## Corrugated Cherenkov Coupler :



- + Uses surface wave in corrugated waveguide.**
- But:**
- Can be adopted for all 4 bands with different width dielectric inserts.
  - Smooth and wide width Impedance response, flat Phase response.
  - Impedance level and width can be controlled with the shape of corrugation plate.
  - Impedance curve spikes can be damped with RF absorber.
  - Simple to fabricate design. Replaceable sensors.