



A TEST BENCH FOR 324MHz RF DEFLECTORS USED IN BUNCH SHAPE MONITORS FOR CSNS-II LINAC UPGRADE

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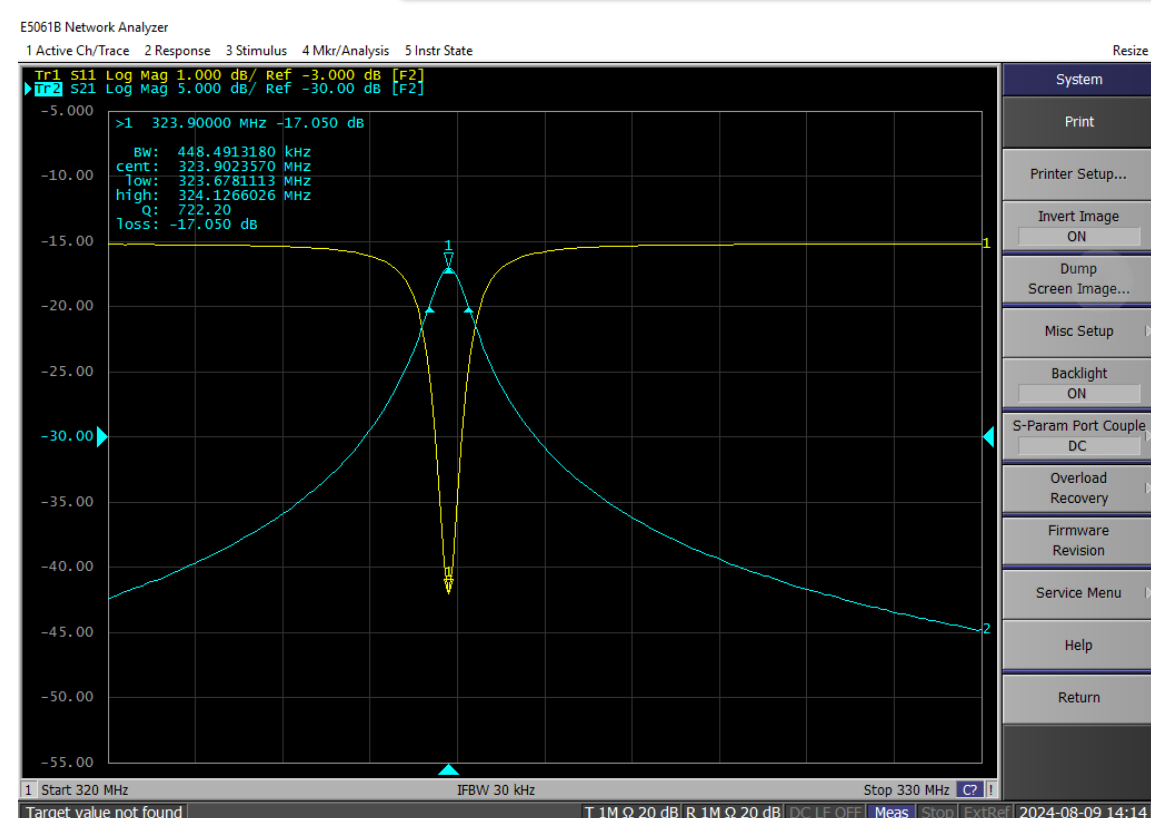
Introduction

Bunch shape monitors based on the transverse modulation of low energy secondary emission electrons, will be used in the measurement of longitudinal beam density distribution in the upgrade of CSNS-II linac. A test bench for commissioning the 324 MHz RF deflectors used in BSM has been built in the laboratory, which consists of a Kimball E-gun, a vacuum chamber for electron optics, an RF stimulator, a 324 MHz RF power source, HV power supplies, a bending magnet and a set of MCP + Screen + camera + DAQ. This paper gives the design consideration, some simulation results of the test bench and the continuing CST design of a $\lambda/2$ RF deflector.

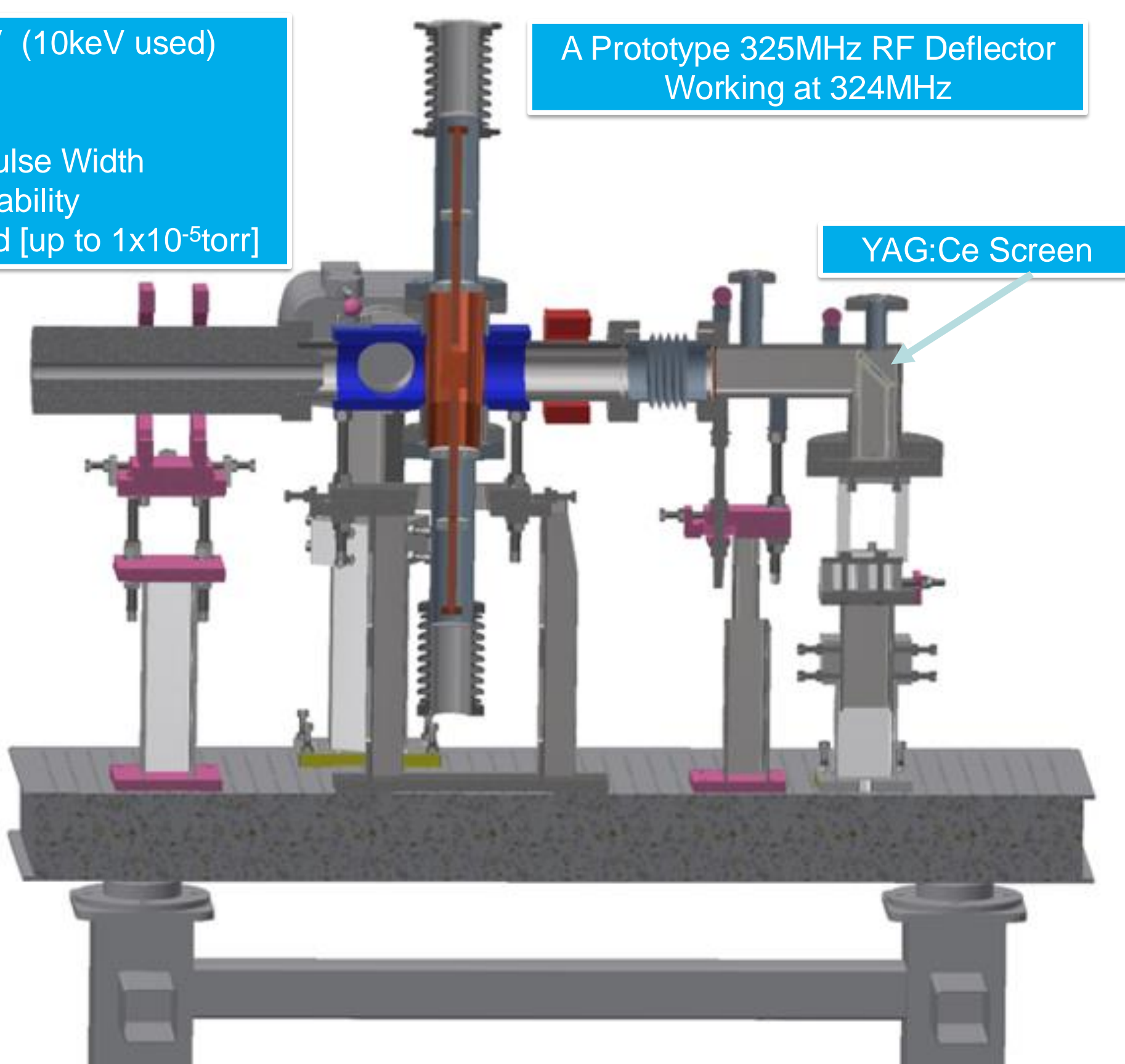
Energy Range: 1 keV to 30 keV (10keV used)
Beam Current: 10nA to 100 μ A
Spot Size: 0.5mm to 25mm
TTL Controlled Grid: DC-2 μ s Pulse Width
Computer/Remote Control Capability
Tantalum disc installed standard [up to 1×10^{-5} torr]

A Prototype 325MHz RF Deflector
Working at 324MHz

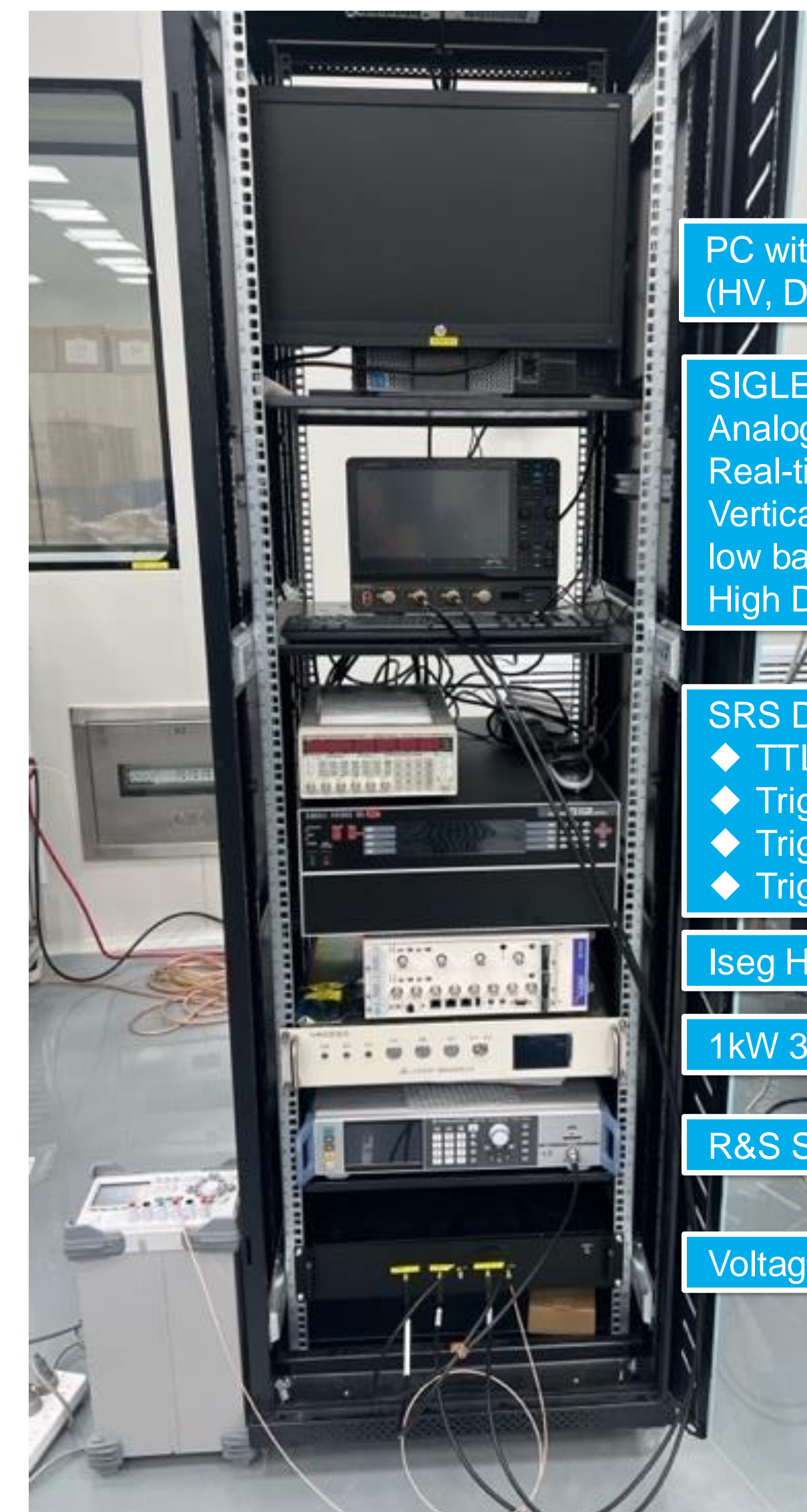
YAG:Ce Screen



S parameters of prototype RFD, measured by Keysight E5061B



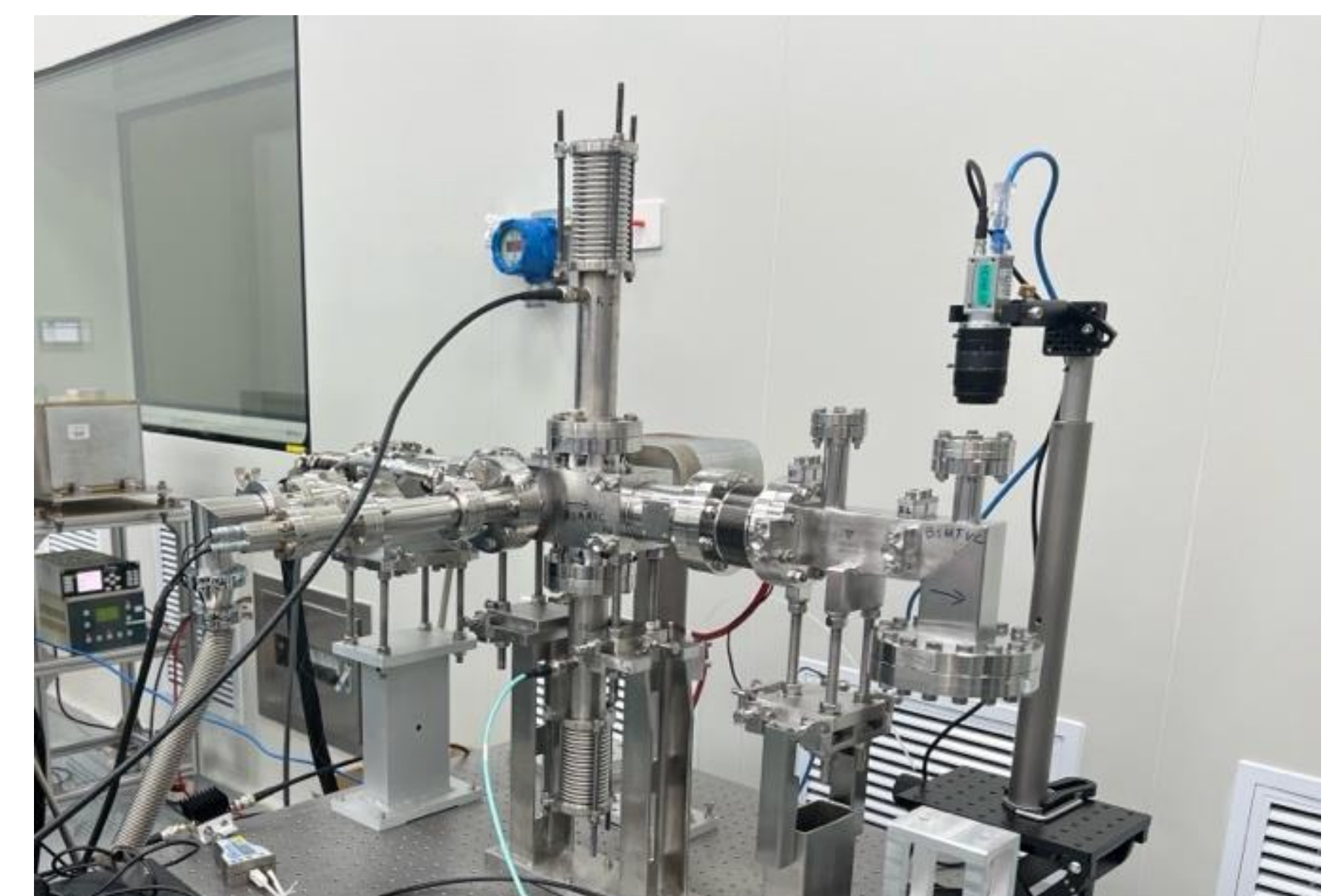
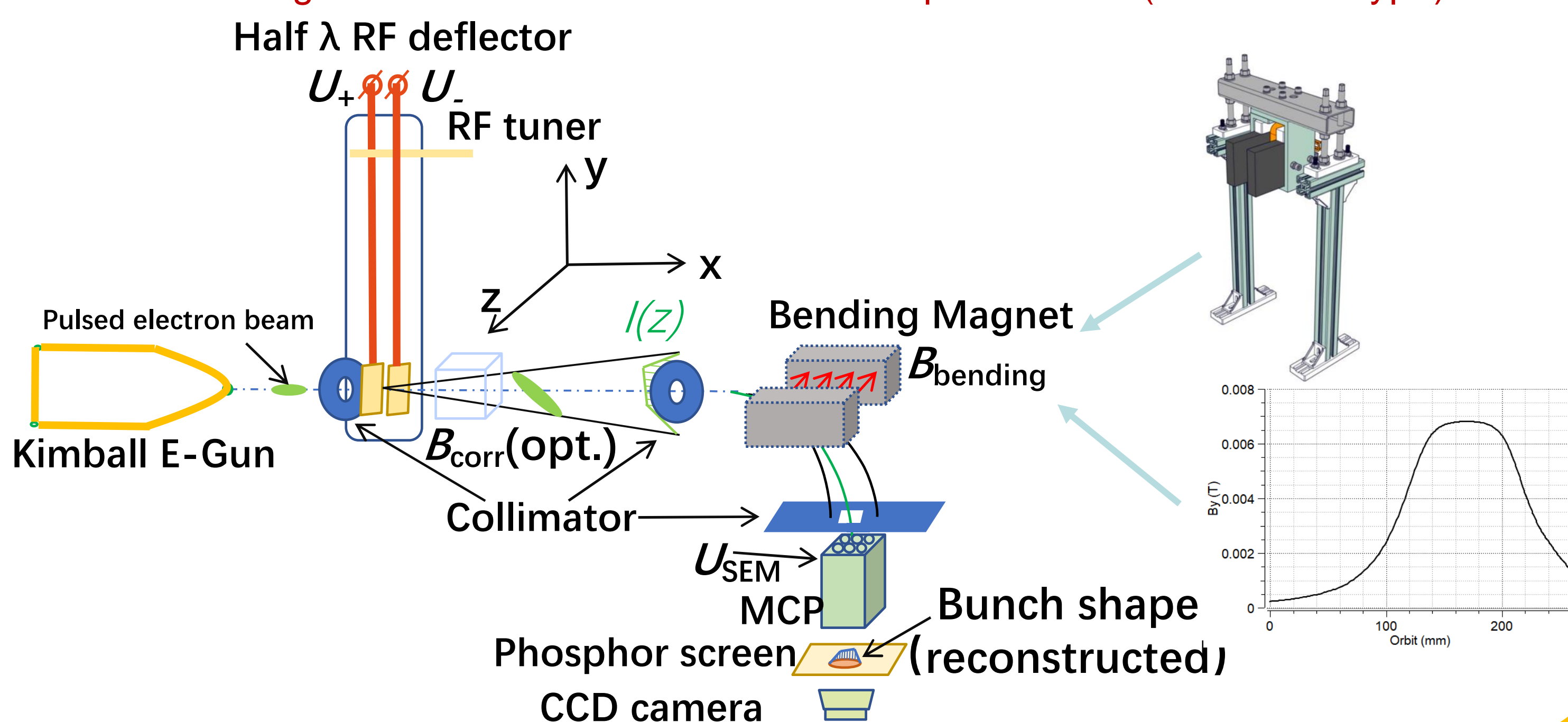
Experiment Control Rack



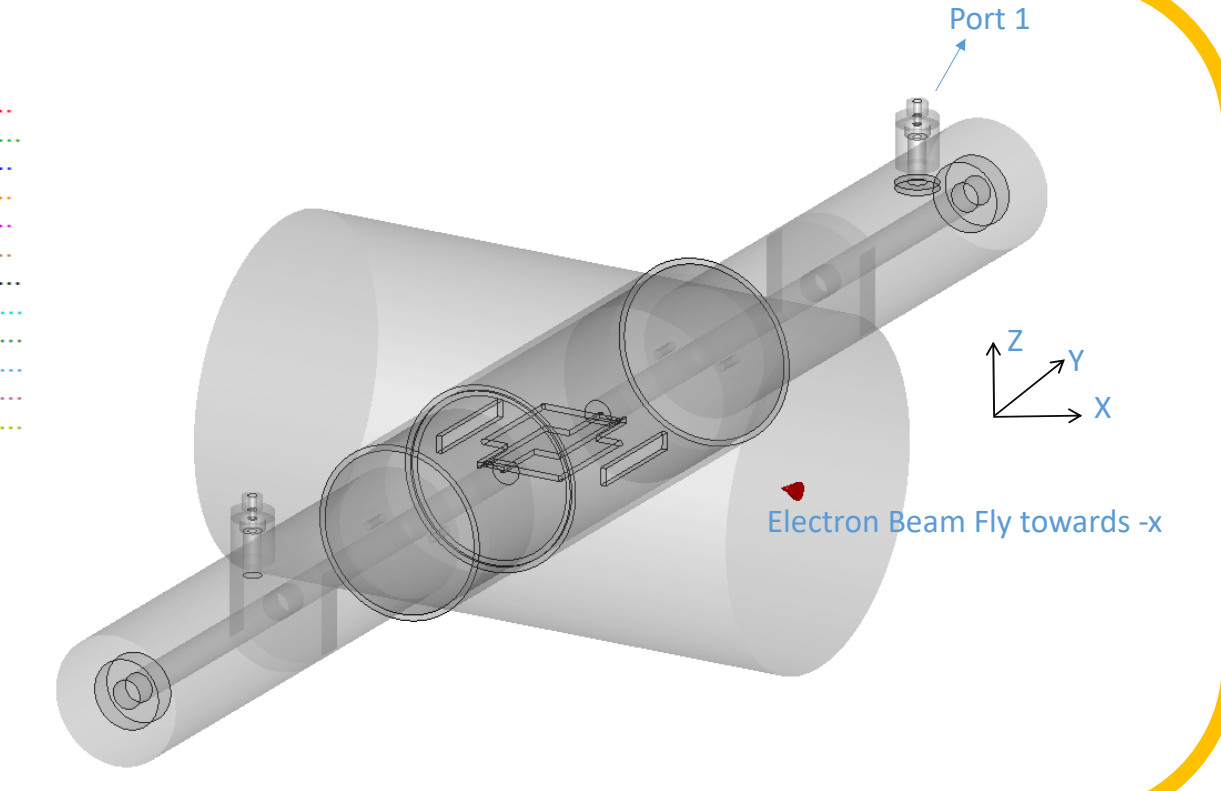
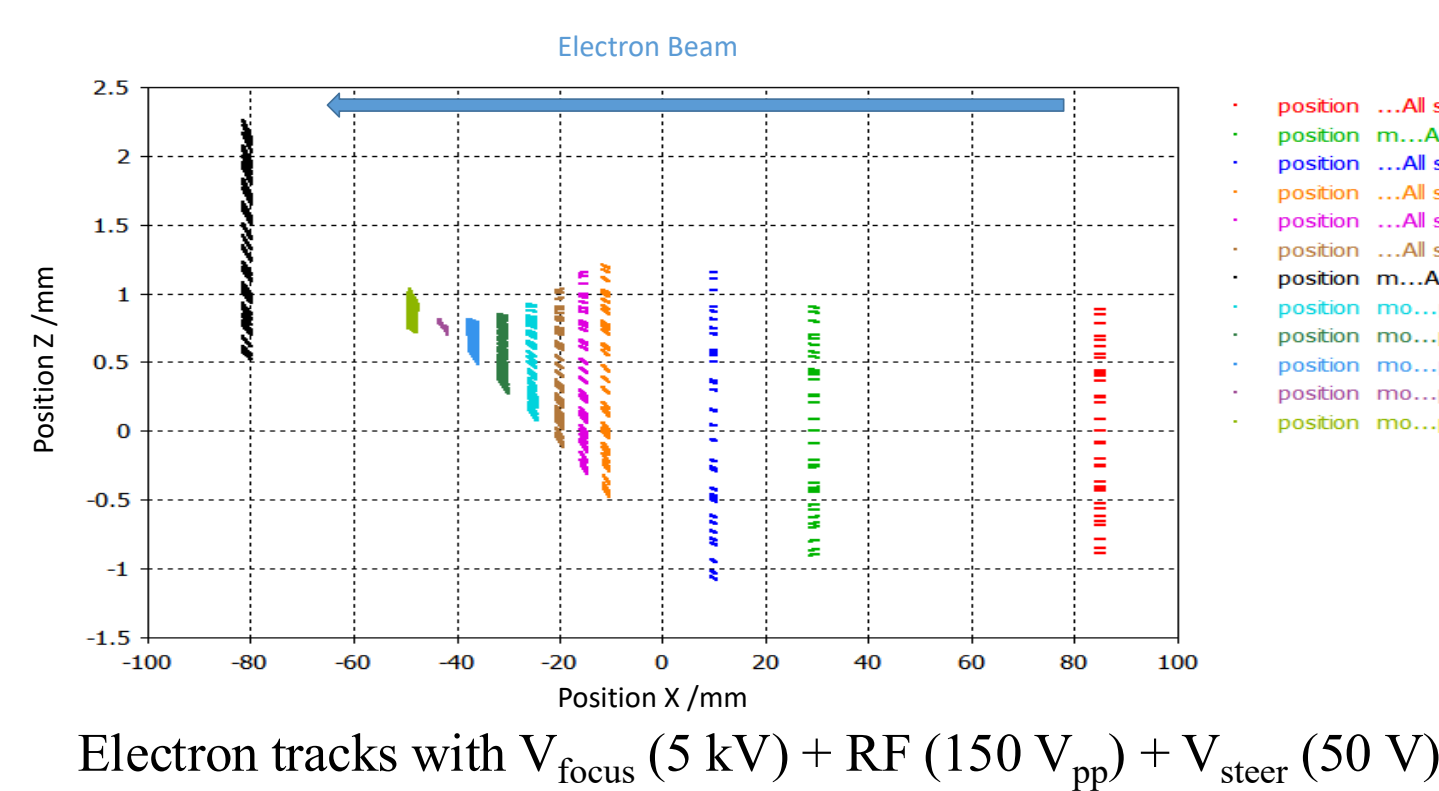
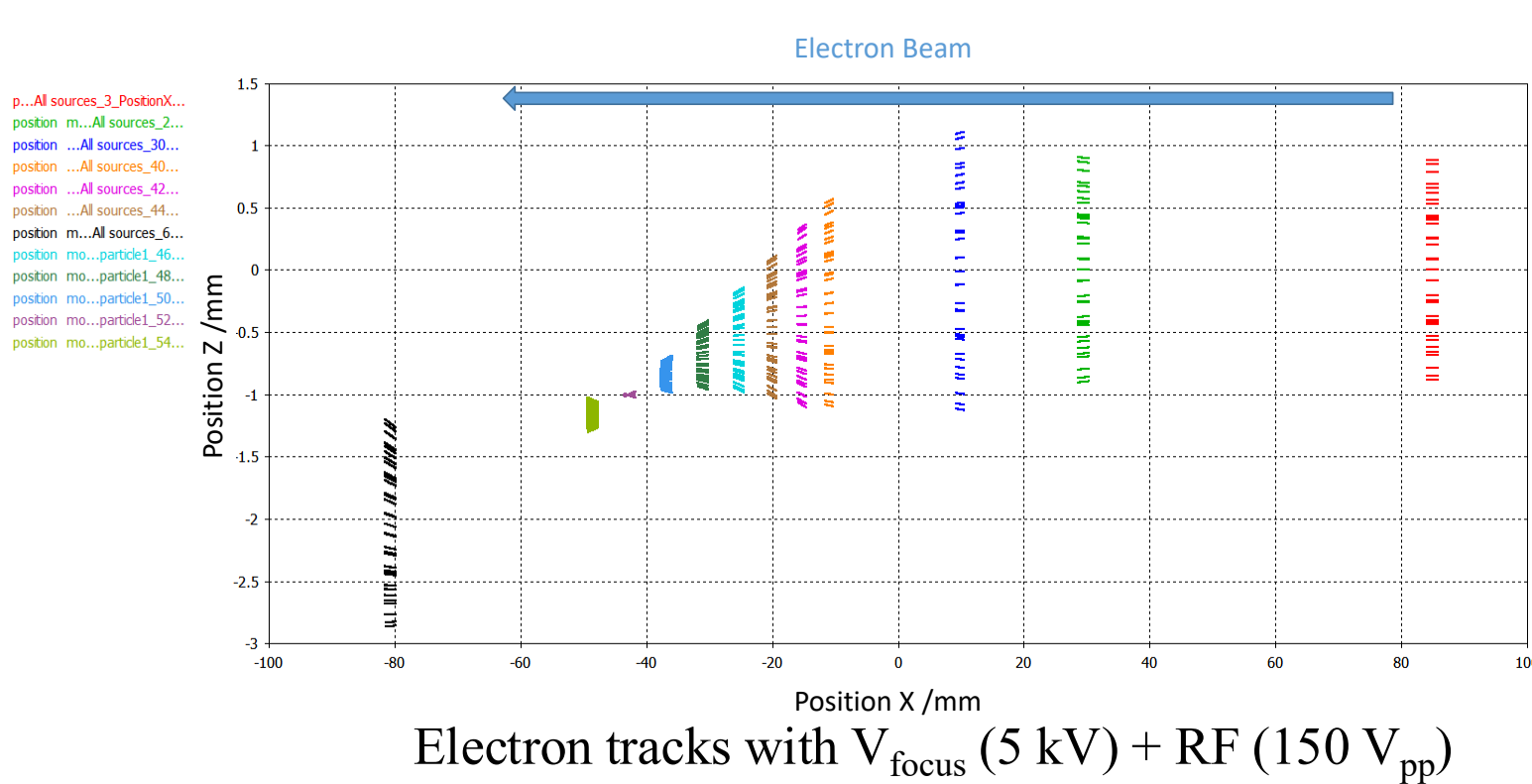
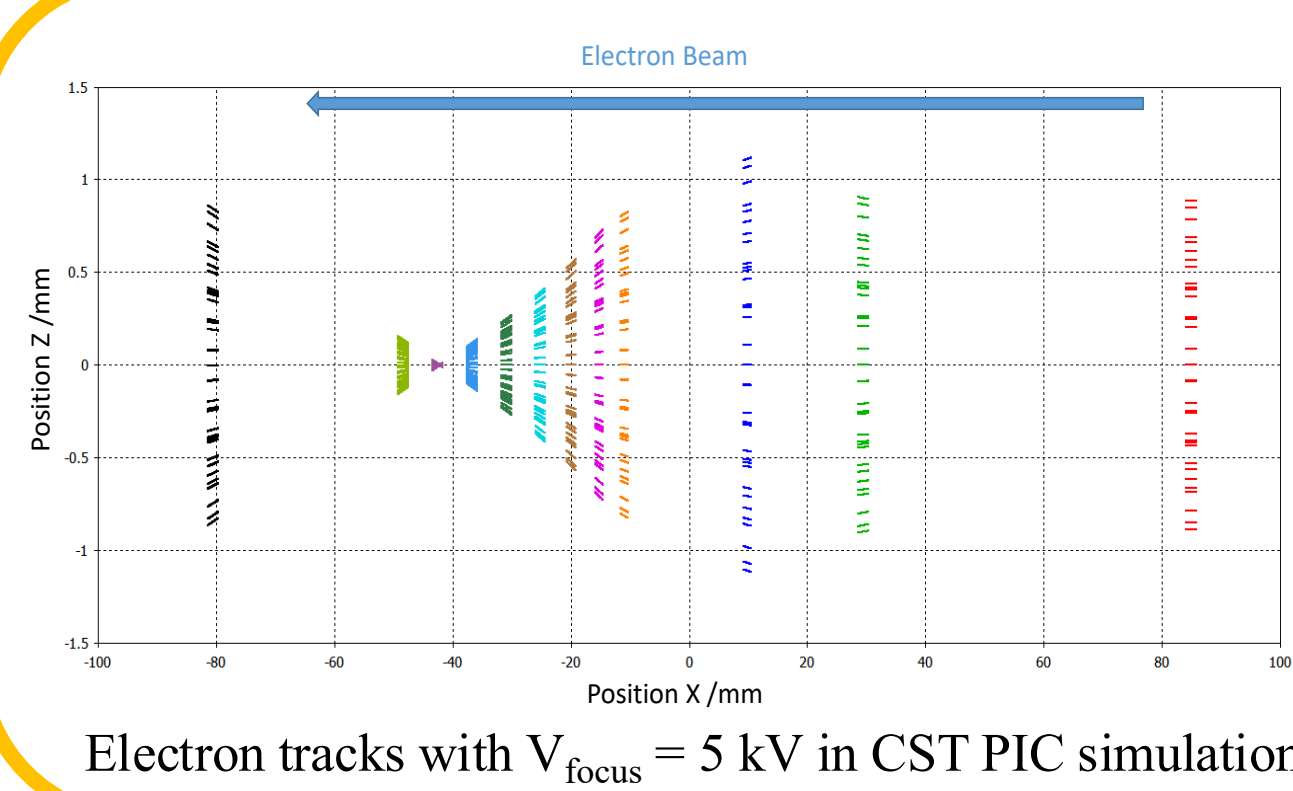
- PC with Remote Control Software (HV, Delay, Phase, Camera, DAQ)
- SIGLENT SDS3104T
Analog channel bandwidth: 1 GHz;
Real-time sampling rate: up to 4 GSa/s;
Vertical resolution: 12-bit;
low background noise: down to 125 μ Vrms at full BW
High DC gain accuracy: $\pm 0.5\%$
- SRS DG645 Digital Delay Generator
♦ TTL Control to EGUN Grid
♦ Trigger for Camera
♦ Trigger for Power Meter
♦ Trigger for DAQ
- Iseg HV supplies: up to 10kV
- 1kW 324MHz Power Amplifier
- R&S SMA100B: 324MHz Reference Signal
- Voltage-controlled Phase Shifter

Test Bench for RFD of BSMs

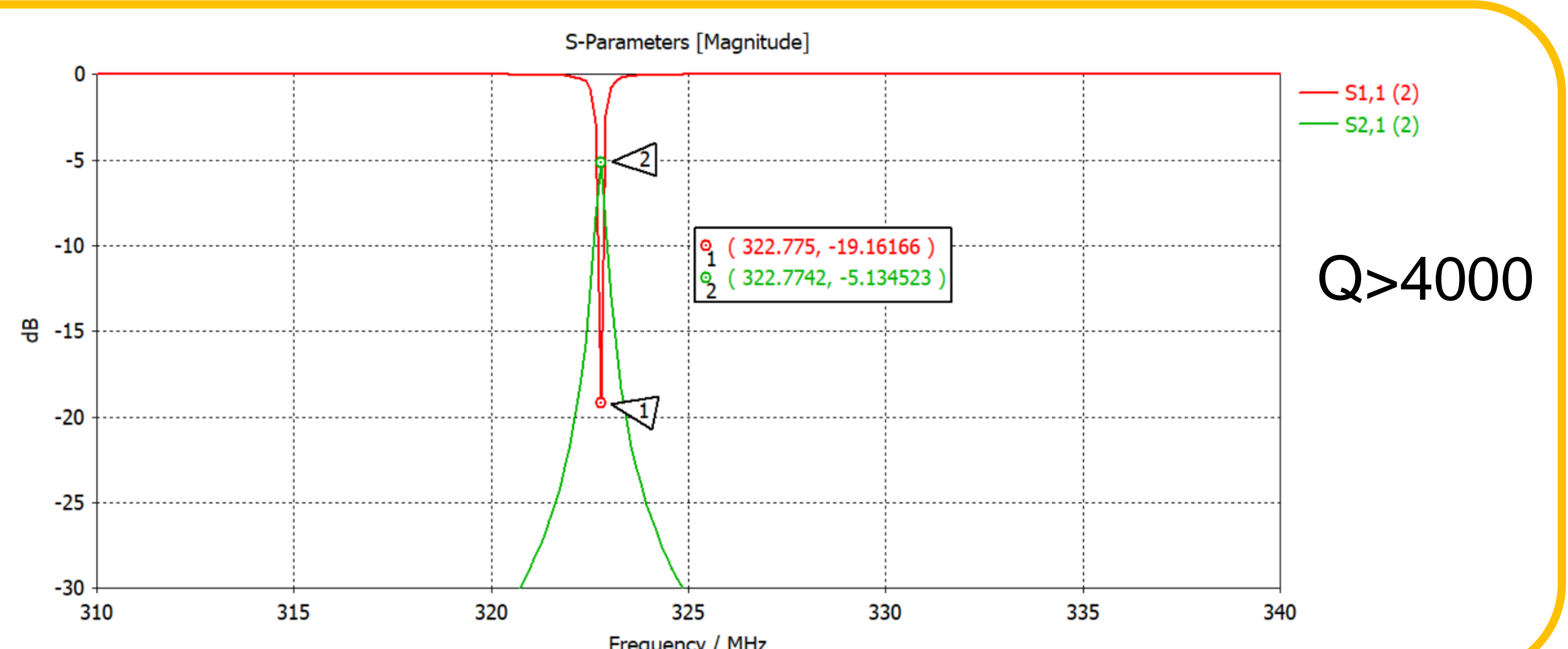
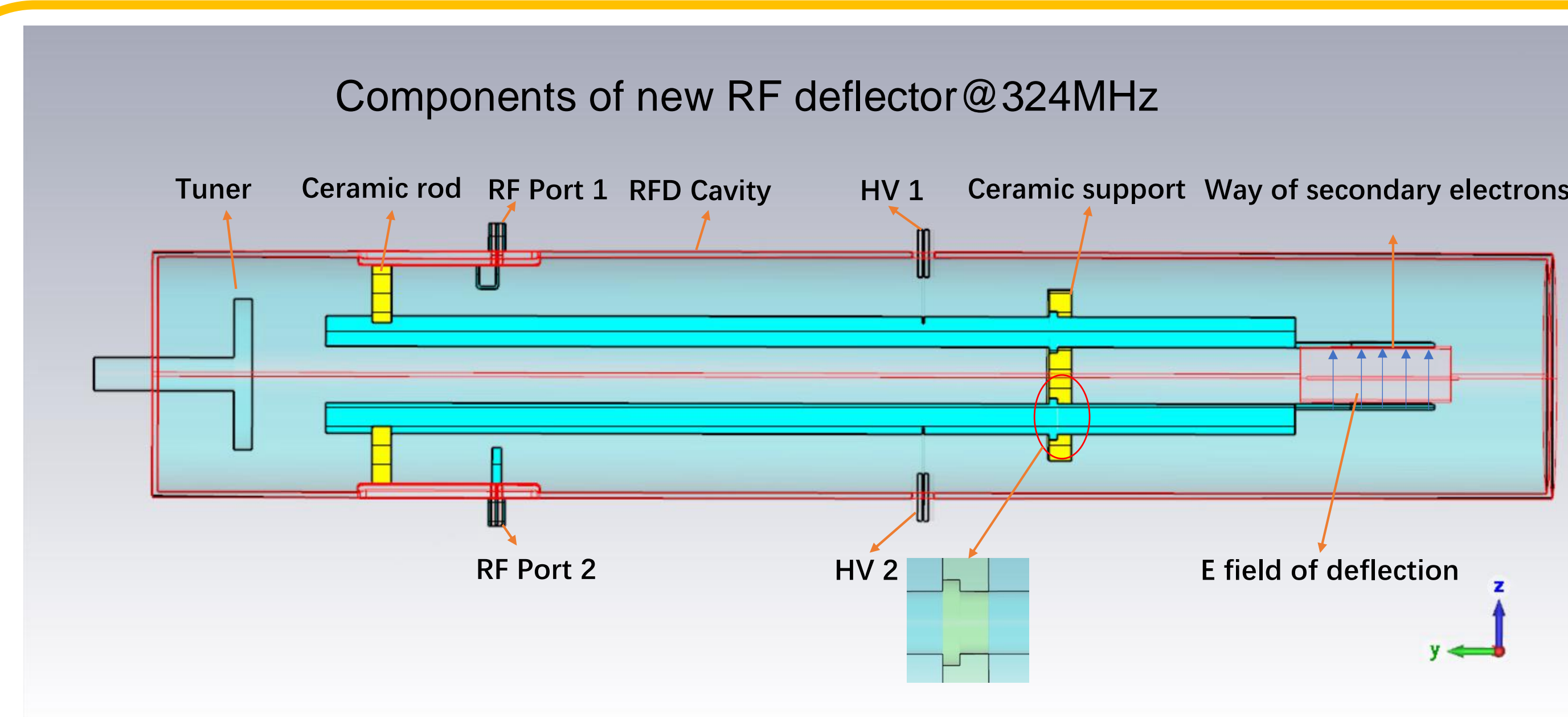
Plan B Configuration of test bench for bunch shape monitors (Feschenko type)



Particle Tracking in Prototype RFD



CST simulation of a new 324MHz RF deflector



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