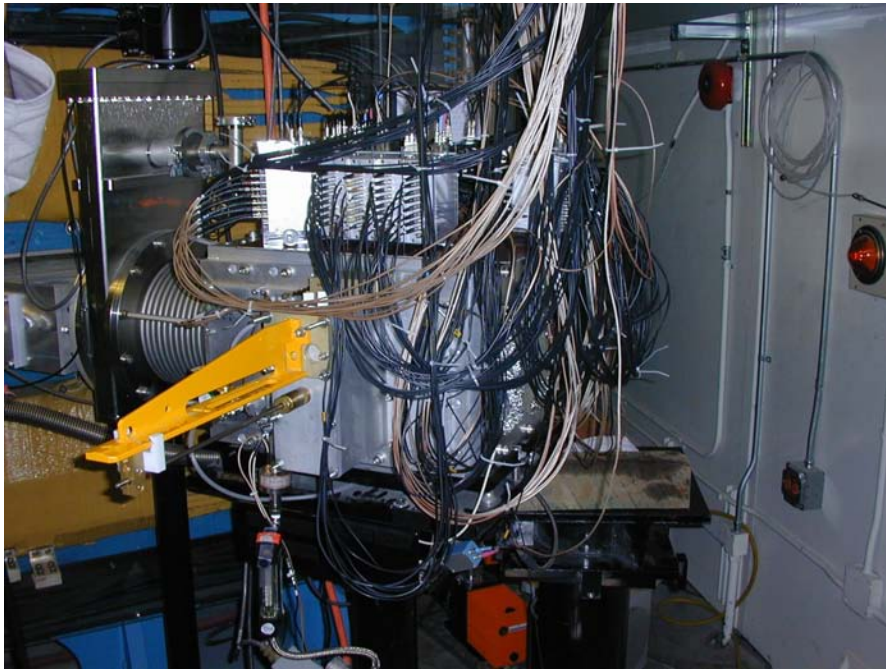


Future Direction of the SuperHeavy Element Program at the 88-inch Cyclotron



Upgrades to the Berkeley Gas-Filled Separator



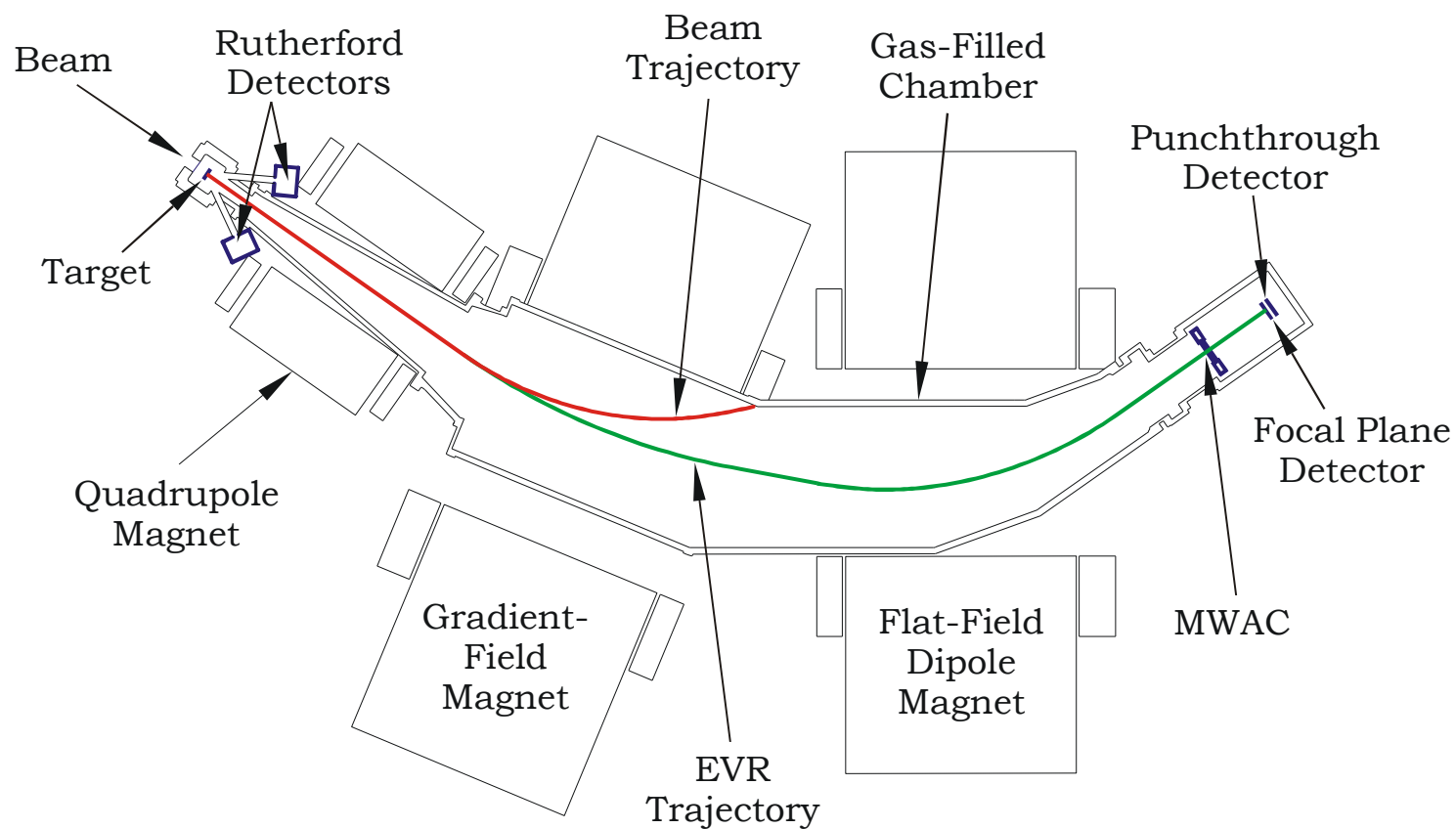
Before



After

Gregory K. Pang
TASCA Workshop 2011
October 14, 2011
GSI, Darmstadt

Experimental Program



Research Goals:

- Production and decay of superheavy elements
- Nuclear structure of heavy element isotopes
- Chemical properties of the heaviest elements

Research Goals – SHE Measurement of Z & A



Research Goals:

Production and decay of superheavy elements
Nuclear structure of heavy element isotopes
Chemical properties of the heaviest elements

Upgrades:

Mass Analyzer
Detection facility
Beam preparation to Mass Analyzer

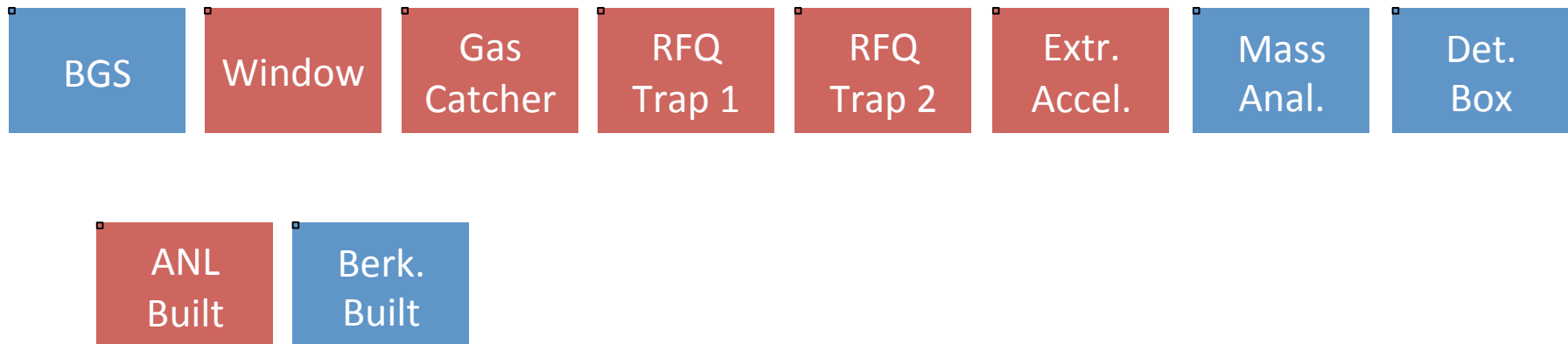
SHE Measurement of Z & A:

α - γ coincidence measurements – nuclear structure, shapes
Spontaneous Fission (SF) Systematics
X-ray – γ coincidence measurements – electron capture decay
etc.

SHE Measurement of Z & A



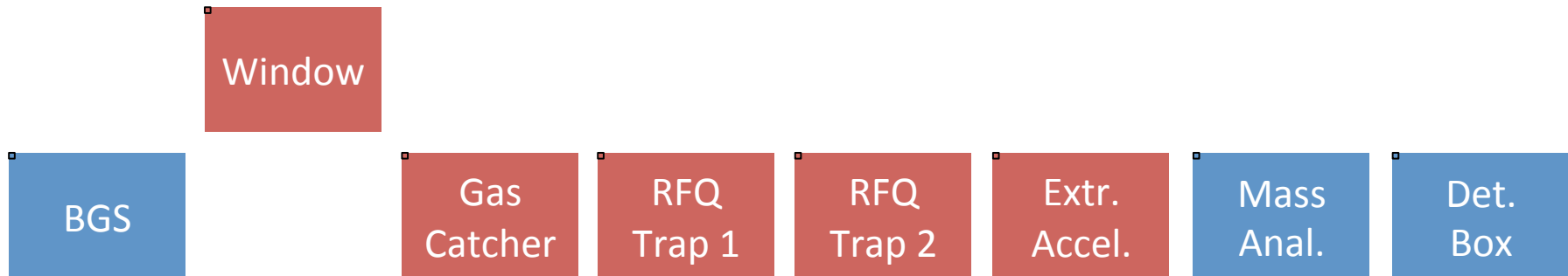
Necessary upgrades to the beamline



SHE Measurement of Z & A

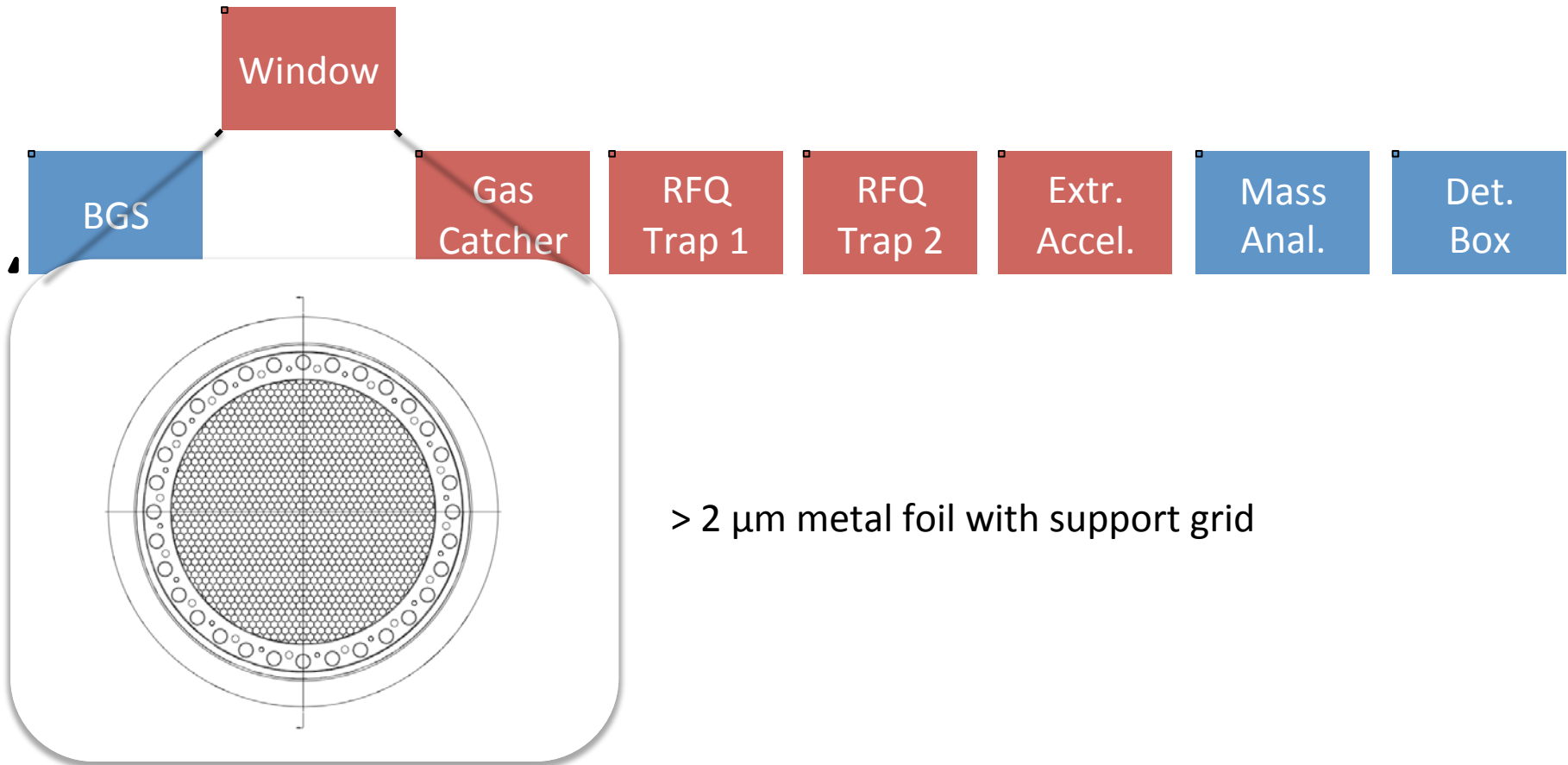


Necessary upgrades to the beamline



SHE Measurement of Z & A

Necessary upgrades to the beamline

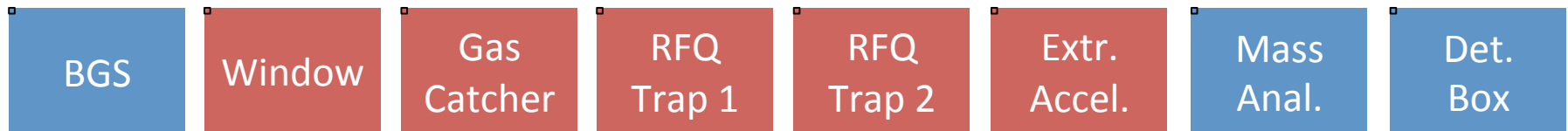


> 2 μm metal foil with support grid

SHE Measurement of Z & A



Necessary upgrades to the beamline



SHE Measurement of Z & A



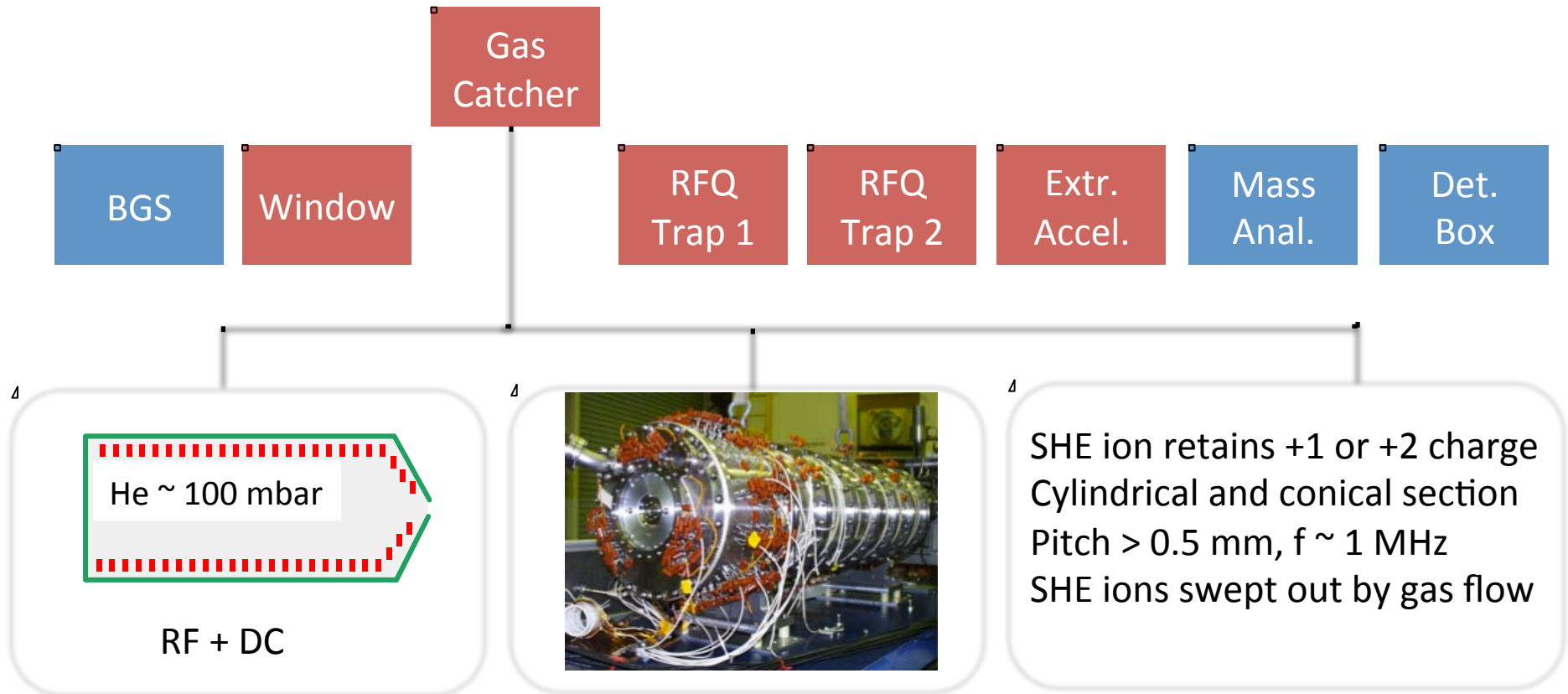
Necessary upgrades to the beamline



SHE Measurement of Z & A



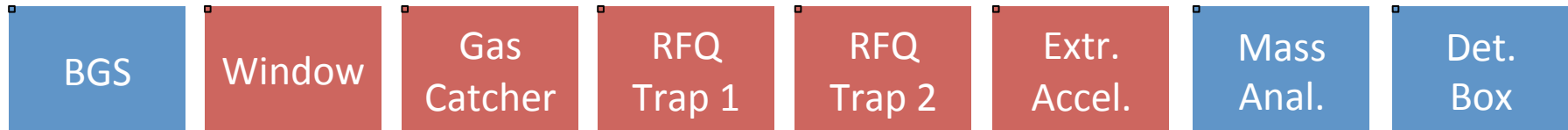
Necessary upgrades to the beamline



SHE Measurement of Z & A



Necessary upgrades to the beamline



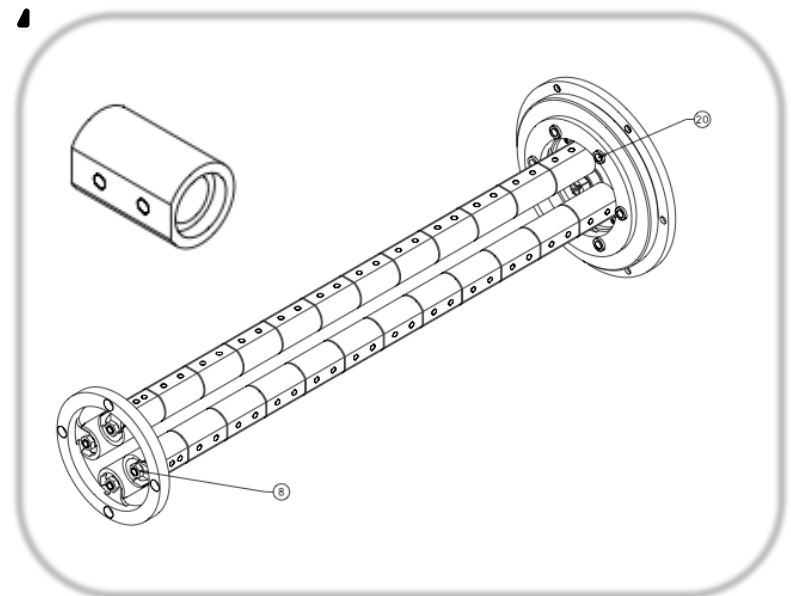
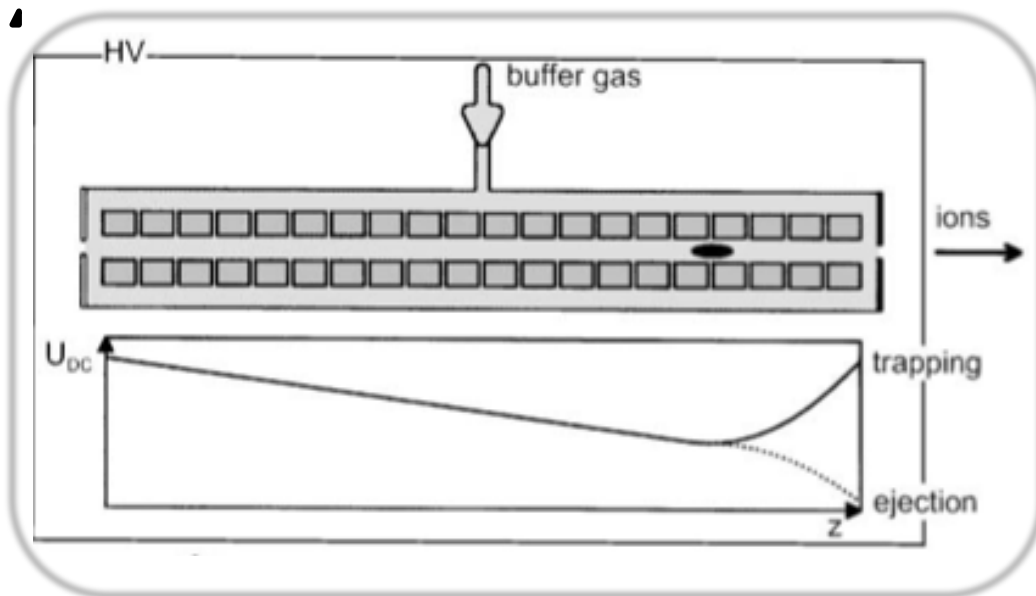
SHE Measurement of Z & A



Necessary upgrades to the beamline



Match acceptance for mass analyzer



SHE Measurement of Z & A



Necessary upgrades to the beamline



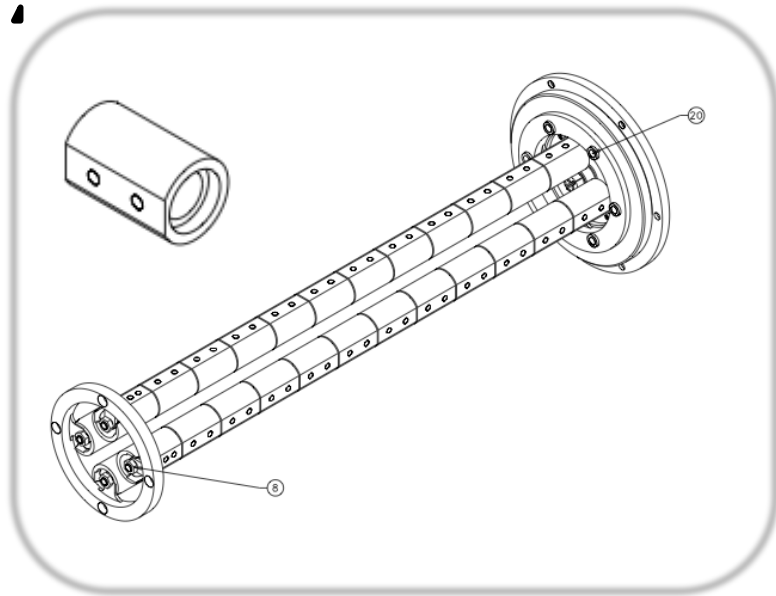
Current design based off of segmented rfq

Current ion transport simulations agree with velocity distribution and axial distribution approx.

Simulations (w/ current exp. param) match current beam properties

Is this sufficient?

New designs are being explored to minimize timing pulse width

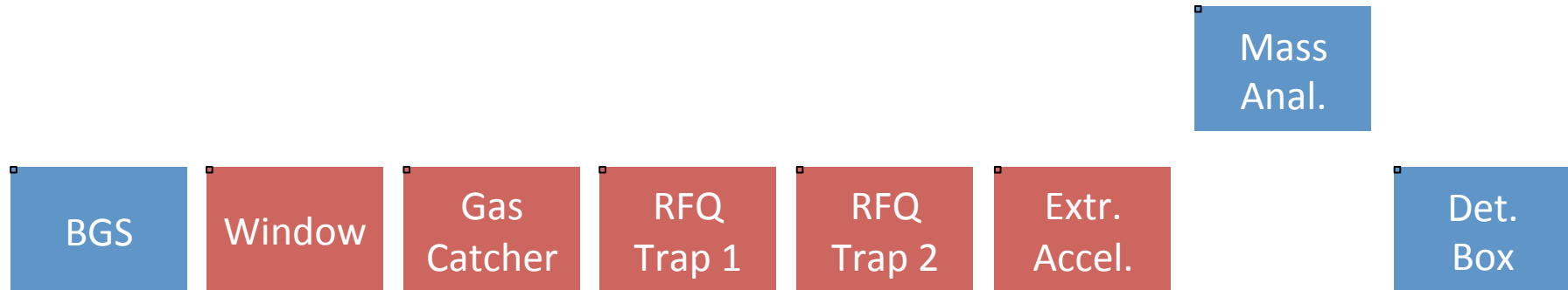


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SHE Measurement of Z & A



Necessary upgrades to the beamline

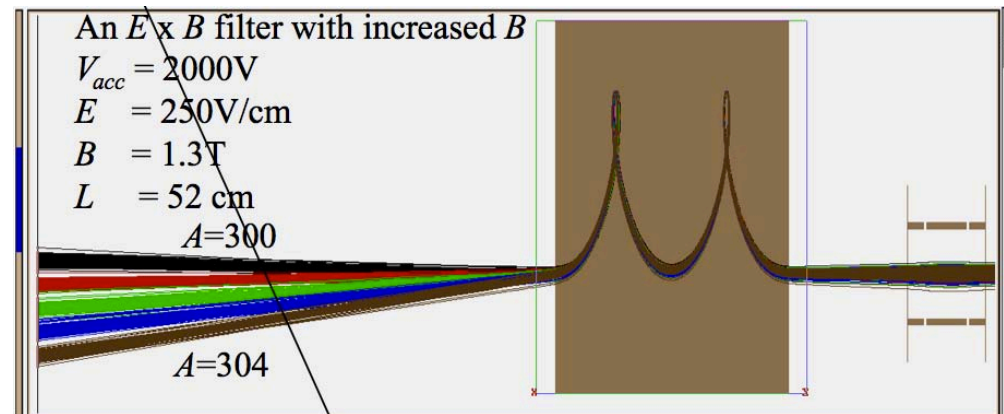


Two designs at the moment:

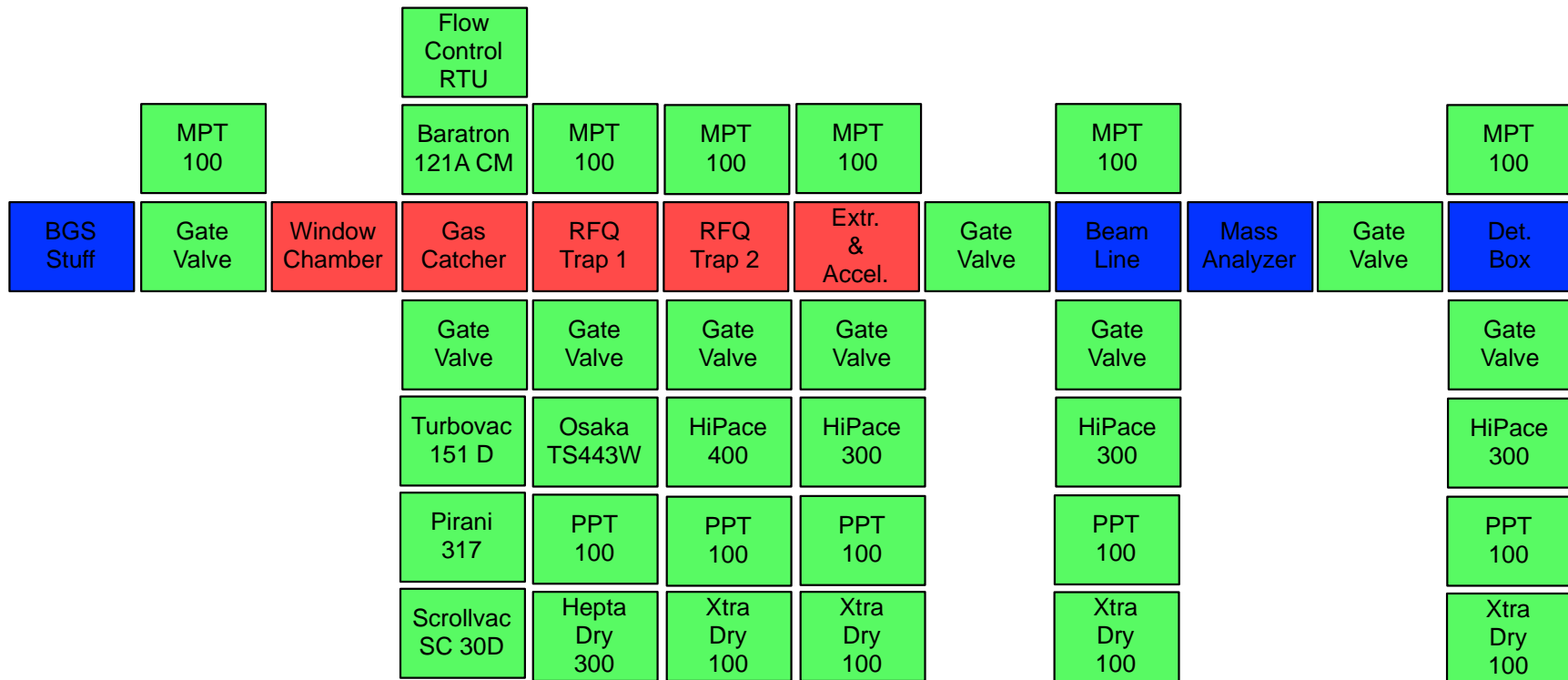
TOF-based system or Trochoid Mass Analyzer System

Trochoid Mass Analyzer

Will depend on beam parameters from trapping/acceleration region



Beamline Schematic



New Focal Plane Detector – CCC Detector



▪
▫ Paper model of CCC detector – better than any picture of the real detector!

Punch-thru Detectors

3 x 64 mm x 64 mm DSSD's
Operated in SSD mode
32 strips per side

Focal Plane Detectors

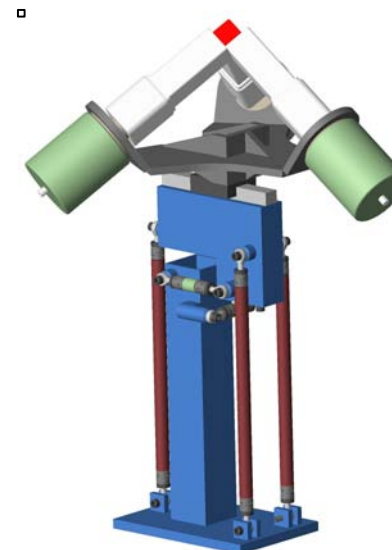
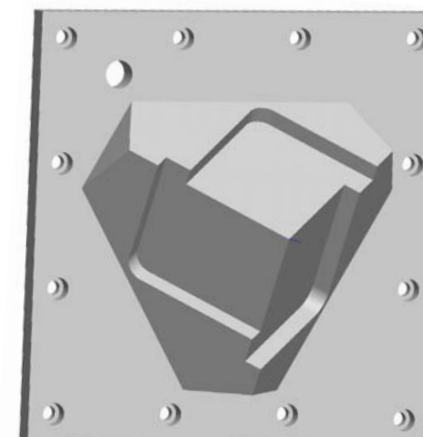
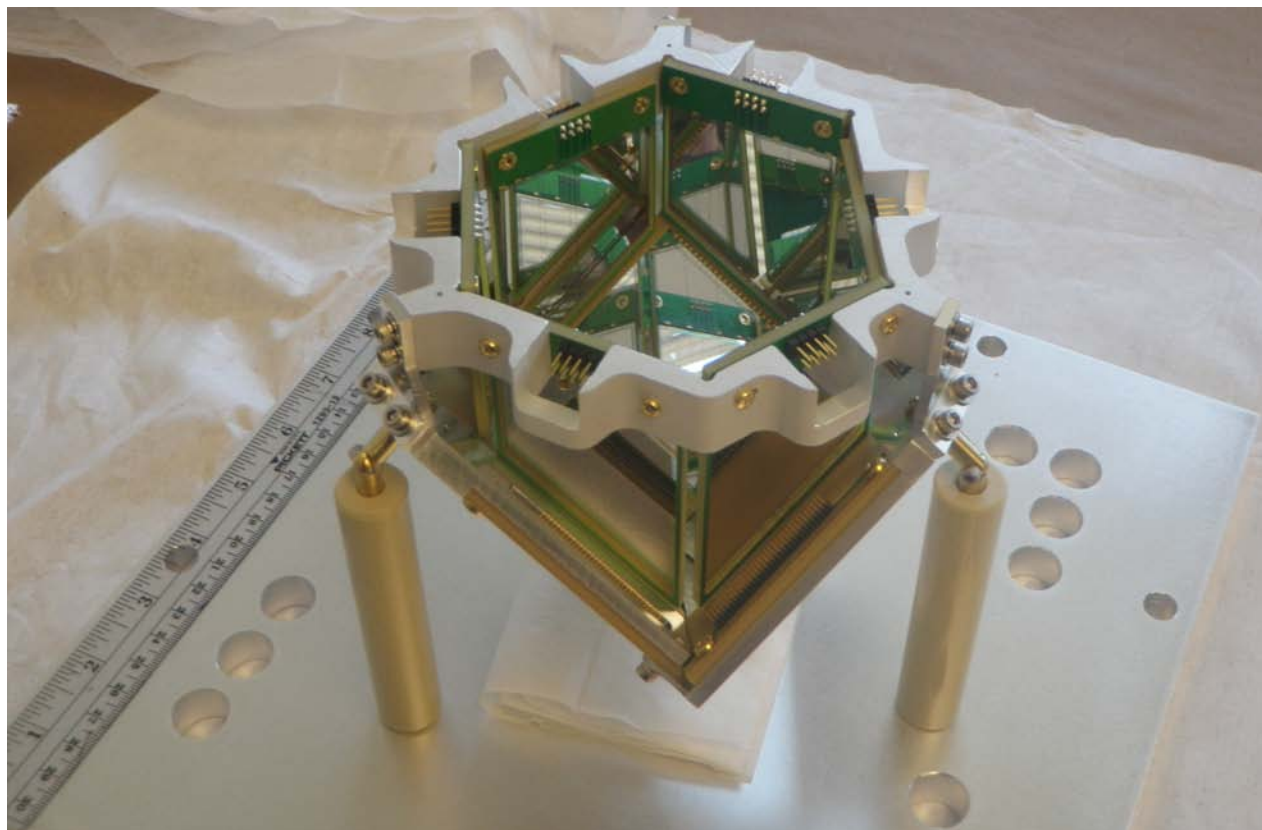
3 x 64 mm x 64 mm DSSD's
32 strips per side

Upstream Detectors

6 SSD's
4 strips per detector



New Focal Plane Detector – CCC Detector



- Detection efficiency gain for recoil – α – K (x-ray) [Z-ID]: **8.6**
- Detection efficiency for recoil – α – K (x-ray) [Z-ID]: **24%**

3 Clover detector configuration

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Timeline



- Original completion date and shipped to LBL: End of January 2012 (yeah right)
- Expected completion date: Spring – Summer 2012 (maybe...)

- Status of project: Early design phase for most beamline parts
 - This requires both mechanical/vacuum and electrical aspects
 - New focal plane almost working at 100%