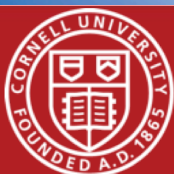


David Burke

**BROOKHAVEN**  
NATIONAL LABORATORY

*a passion for discovery*

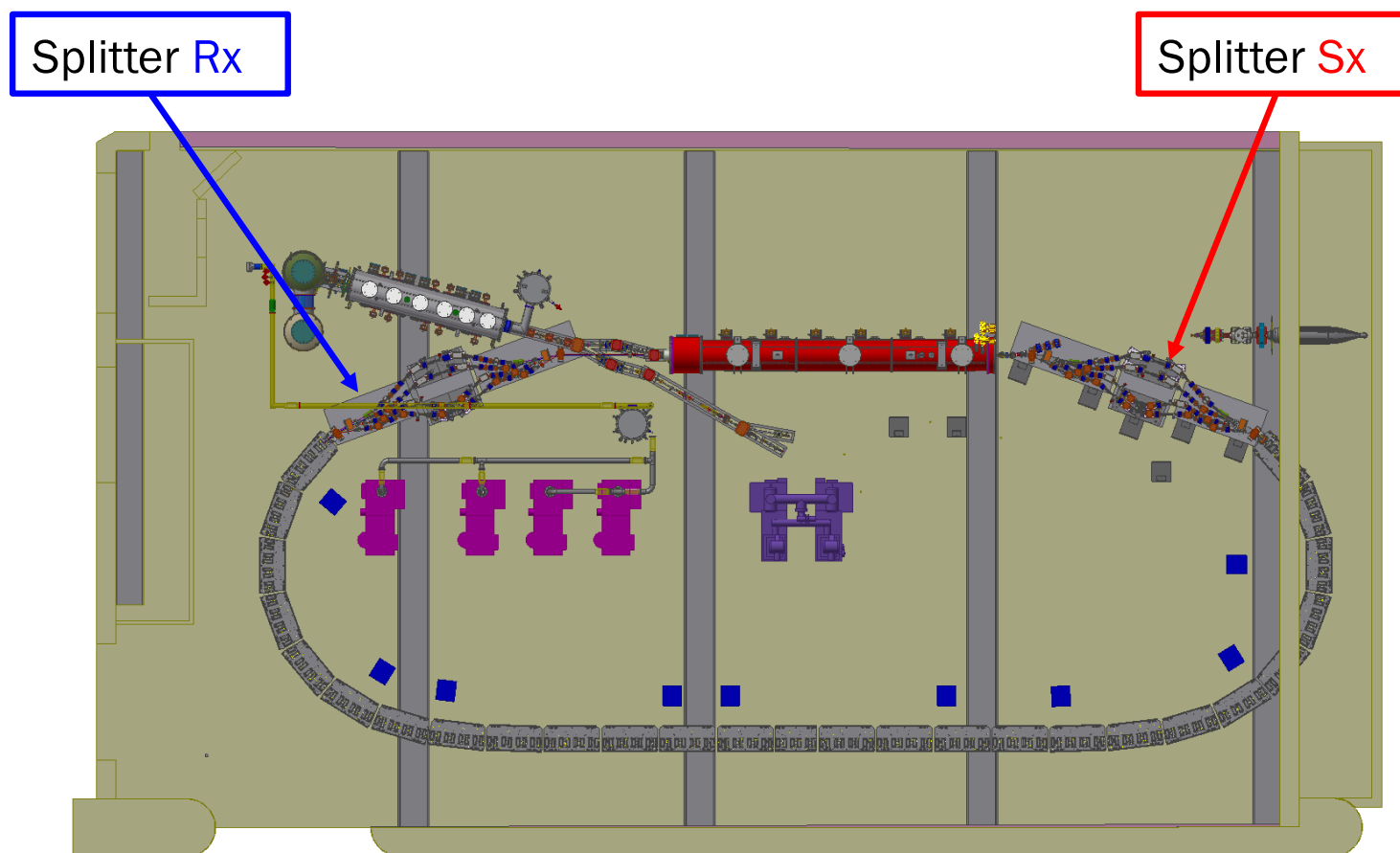


Cornell Laboratory for  
Accelerator-based Sciences and  
Education (CLASSE)

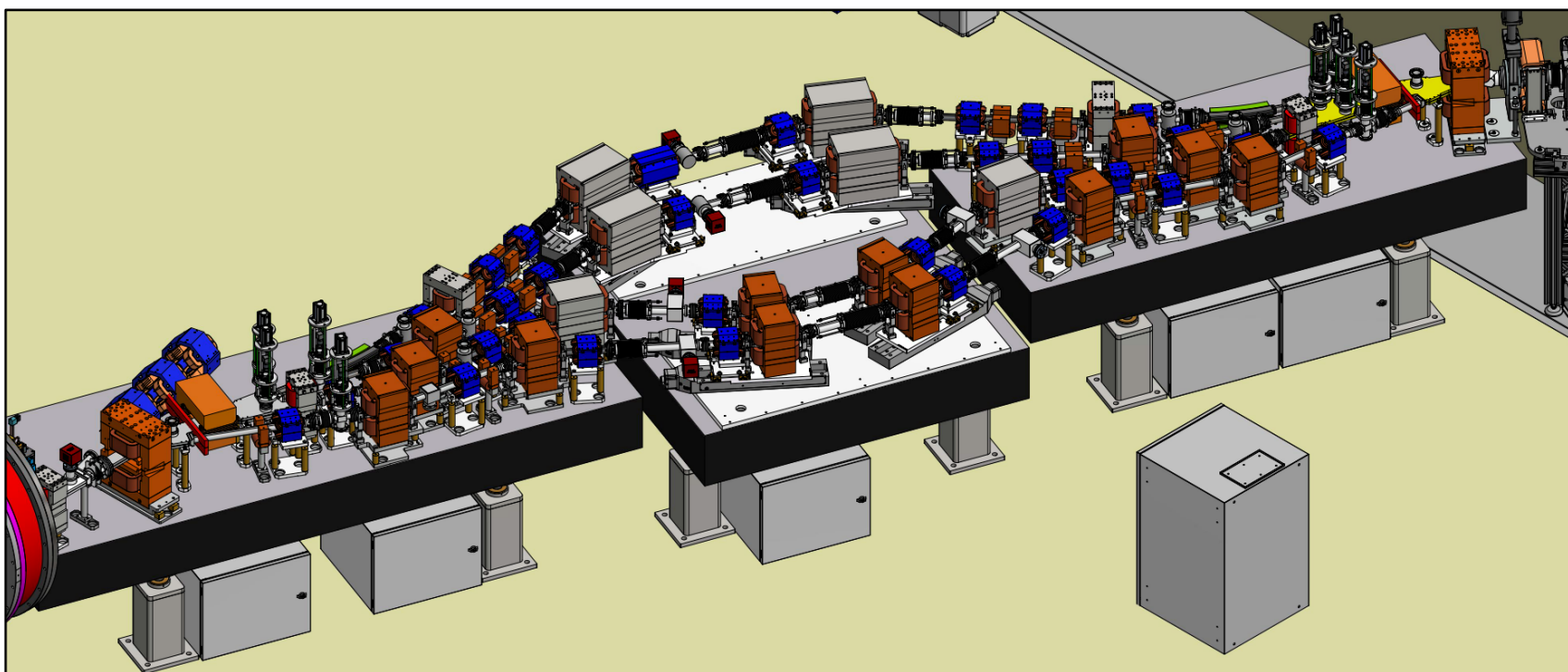
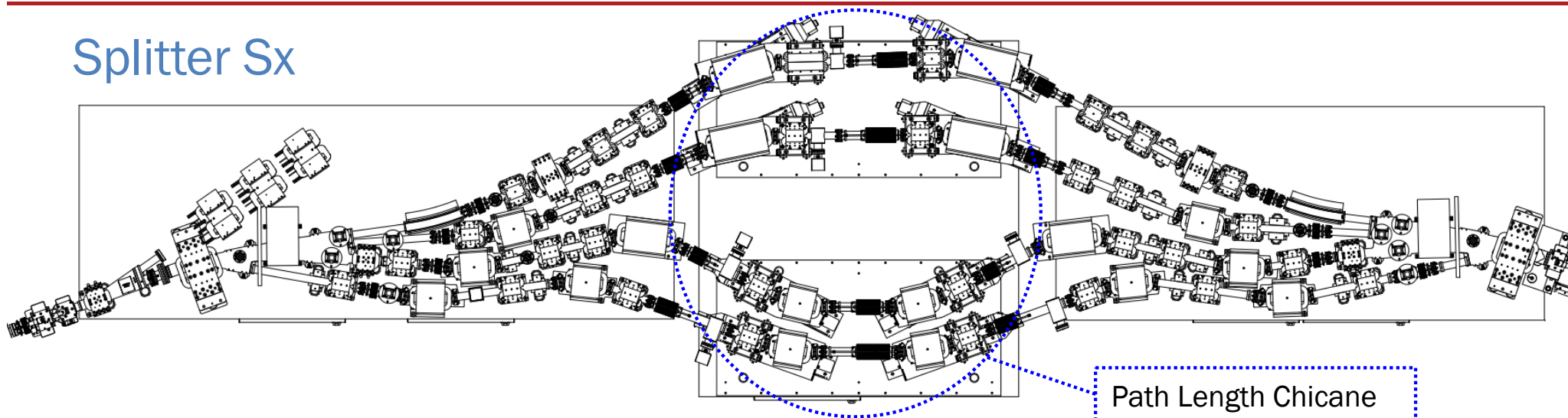


## Splitter Purpose:

- 1) Place the individual beam energies on-orbit for the PM Arc (Splitter **SX**) and retrieve the beams from the FFA for aiming on-axis into MLC (Splitter **RX**)
- 2) Adjust the beam path for the required time of flight to achieve energy recovery

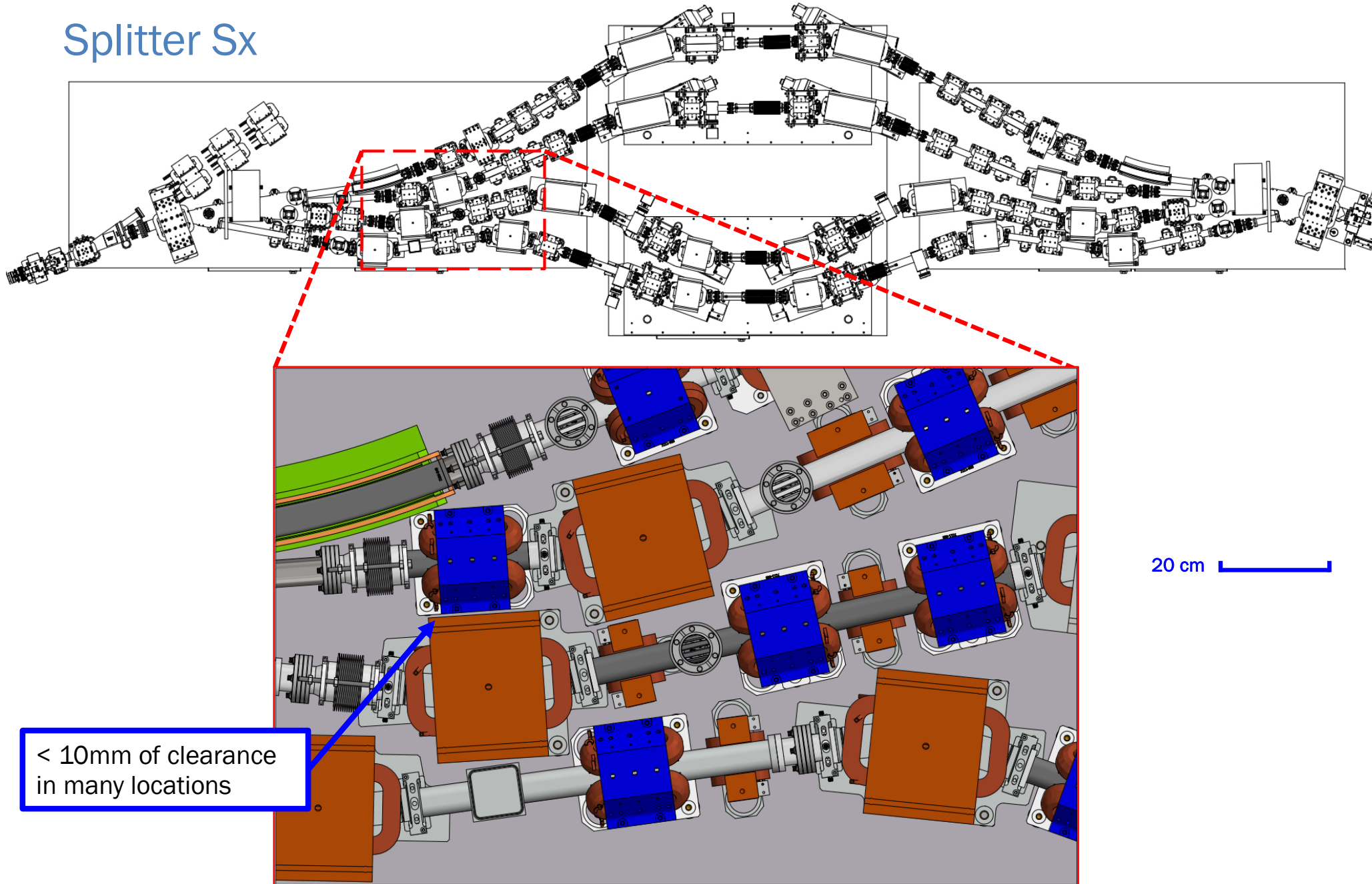


## Splitter Sx





## Splitter Sx



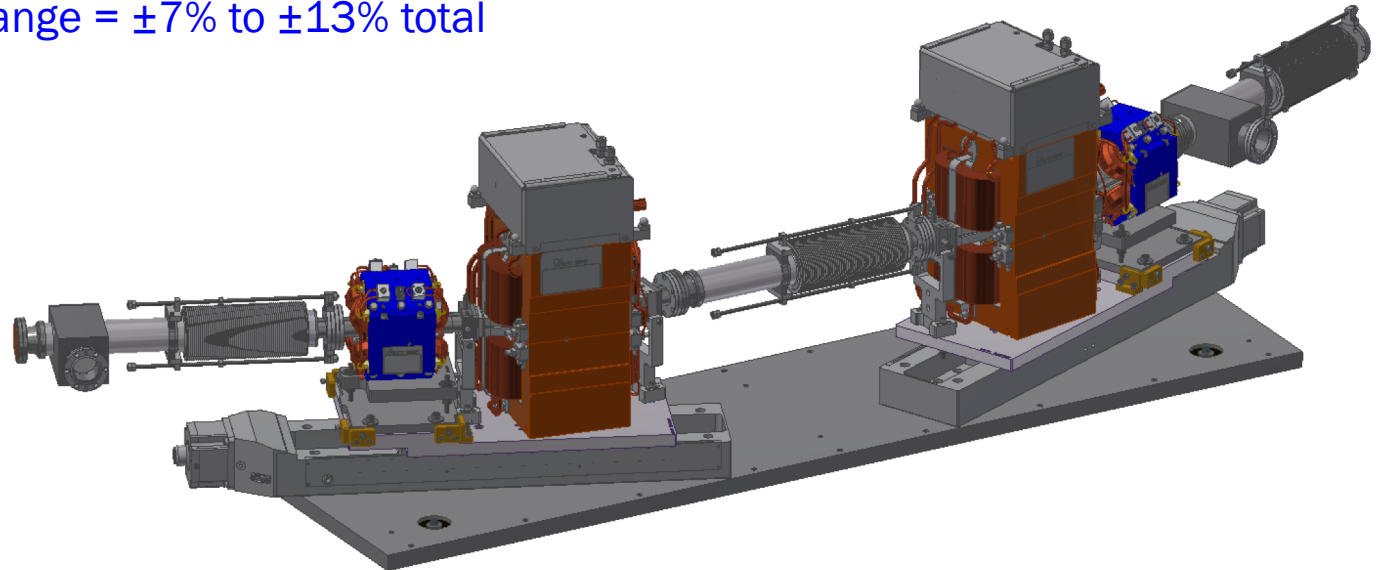
< 10mm of clearance  
in many locations

20 cm



## Requirements:

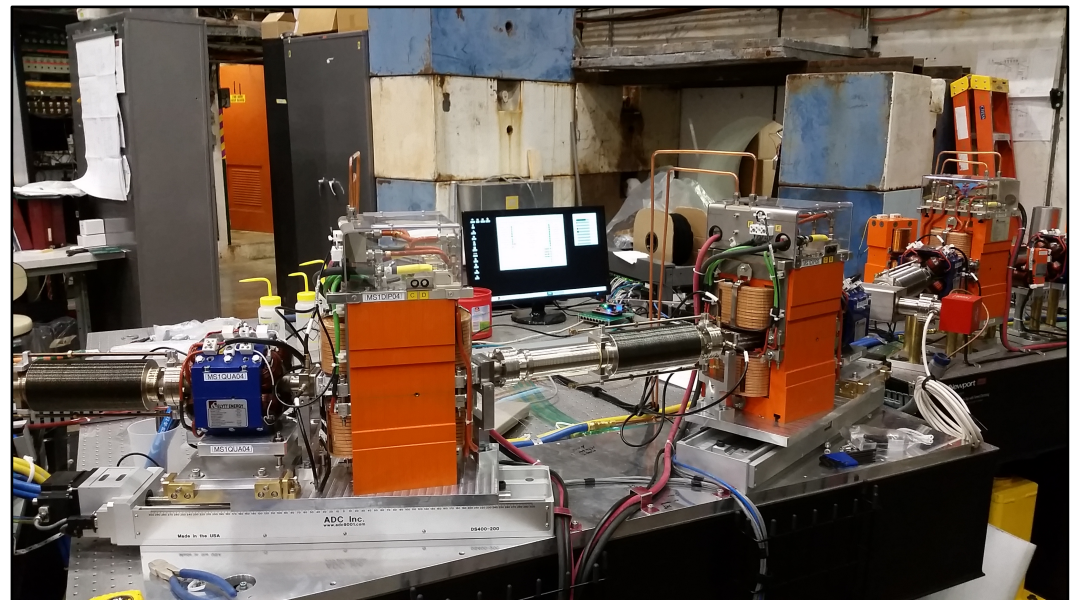
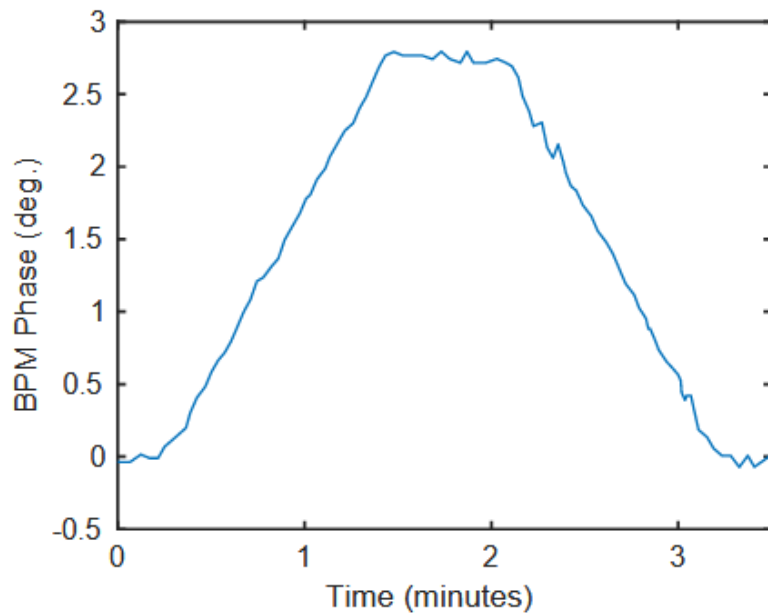
- $\pm 20\%$  of  $\lambda_{RF}$  Total ( $\pm 10\%$  per Splitter)
  - Wavelength = 230.61 mm
  - $\pm 10\%$  of  $\lambda = 23$  mm
  - Actual adjustment range =  $\pm 7\%$  to  $\pm 13\%$  total



	SX		RX		Total	
	%	mm	%	mm	%	mm
42 MeV	3.50%	8.06	4.00%	9.23	<b>7.50%</b>	<b>17.29</b>
78 MeV	3.76%	8.67	4.38%	10.10	<b>8.14%</b>	<b>18.77</b>
114 MeV	3.20%	7.38	3.86%	8.91	<b>7.06%</b>	<b>16.29</b>
150 MeV	5.86%	13.52	7.01%	16.17	<b>12.87%</b>	<b>29.69</b>

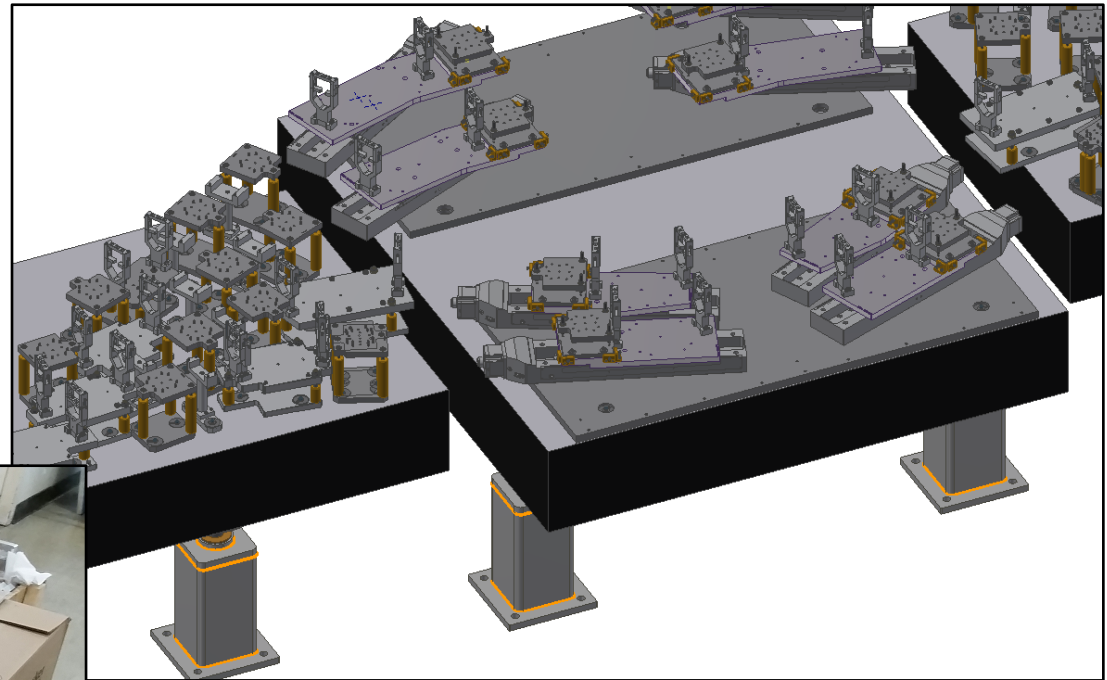
## Testing:

- Functional testing of mechanical and vacuum
- Moved stage 10 mm during FAT operation
- Beam arrival data recorded
- **Success!**



## Mechanical:

- All Splitter components are fully designed
- Less than 5% of mounts are remaining fabrication
- Integration soon!





## Magnets:

- 50% of magnets have been delivered
- Common magnets are due December 12<sup>th</sup>
- Long Water-cooled Quad in design phase
- Septa in the design phase

Type	Qty	Batch #1 Shipped		Batch #2 remaining	S#1	S#2	S#3
H-Dipole-1	24	6		18	18		
H-Dipole-2	4			4		4	
H-Dipole-3	8			8		8	
Quad-1-A	44	8		36		36	
Quad-1-W	20			20			20
VC1 (long)	16			16	16		
VC2 (short)	16	4		12	12		
	132	18	Total	114	46	48	20
			%	100%	40%	42%	18%



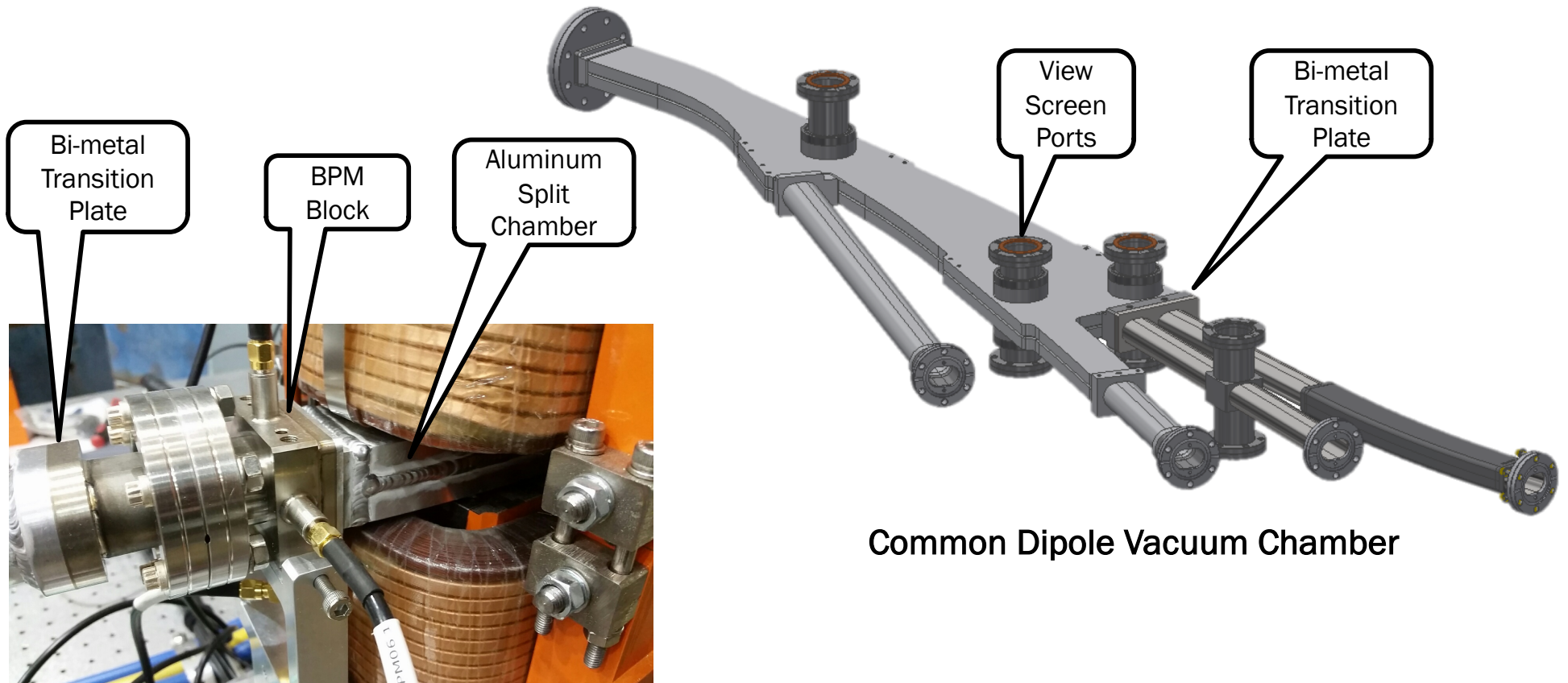
*Delivered*

*Due in TBD*

*Due in TBD*

## Vacuum:

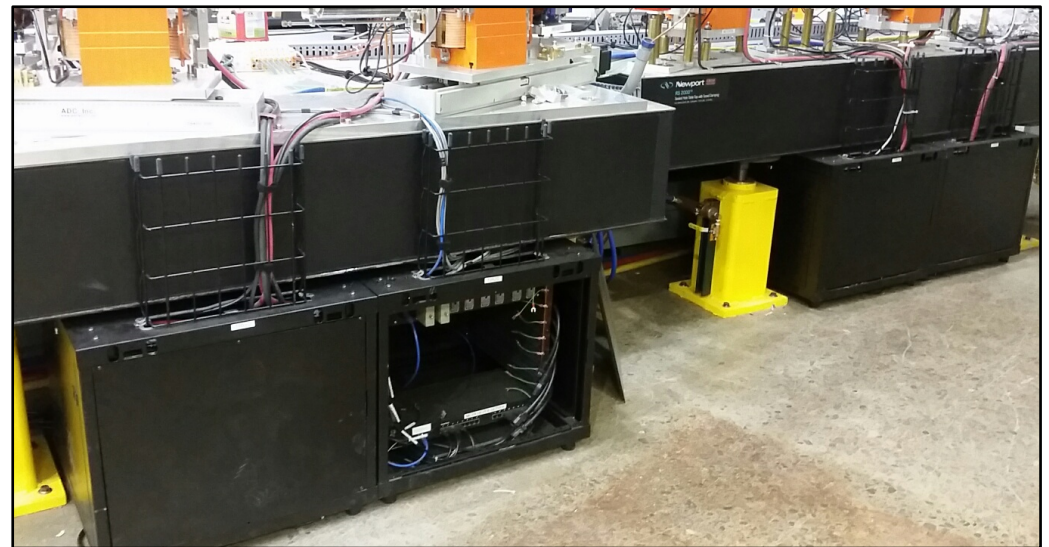
- Many chambers/parts finished or close to being delivered
- Cleaning then welding are the next steps before integration
- Functional vacuum components designed, built and tested for FAT
  - Extended into the 4-pass design for **very quick design turnaround**



Common Dipole Vacuum Chamber

## Vacuum:

- All power supplies for the splitter magnets have been ordered – using off-the-shelf TDK-Lambda supplies
- As they arrive they are mounted into half height racks for wiring to the magnets
- Power Supplies for the septa magnets have been identified, but order is waiting until the coil design is complete. They are also off-the-shelf with 30 day delivery





## Conclusion:

Since the completion of FAT, the team from Cornell and BNL have once again worked closely, collaborating on the difficult challenges within the Splitter.

### The key accomplishments since FAT:

- 1) Finalized the Bmad lattices to solve space challenges for the congested areas of the Splitter.
- 2) Expanded the vacuum and mechanical designs from the FAT for seamless completion of the 4-pass configuration.
- 3) Work closely with vacuum and magnet suppliers on deliveries.