

# Transmon design and procurement status

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G1100128-v1

# Transmon Deliverables

## 1. Alignment signals

Gouy phase telescope and 2 quadrant photodiodes at 90 degrees of relative Gouy phase

Pico motors for each QPD to adjust DC pointing

## 2. Beam dump

Deal with  $\leq 5$  W of IR light without scattering into IFO

Remove heat from table without flexing

## 3. Green injection

Provide mode matching and beam steering for the green beam to the arm cavity

Return the reflected green beam and Hartmann reference beams to air

## 4. Infrared extraction

Mode matching and beam steering for the IR beam

Block the IR beam during science mode

# ISC Transmon

## 1. Telescope

Folded, off-axis parabolic telescope

20:1 reducing telescope  
(6.2cm to 3.1mm)

Beam focusing (else  
divergence = 0.5 mrad)

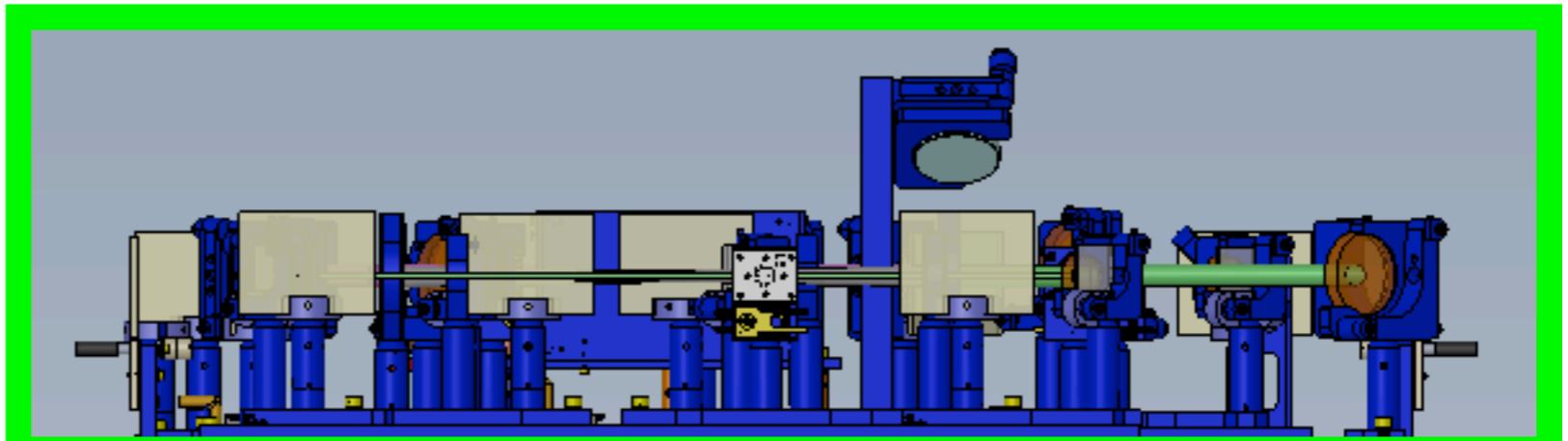
## 2. ISC Table

IR QPDs

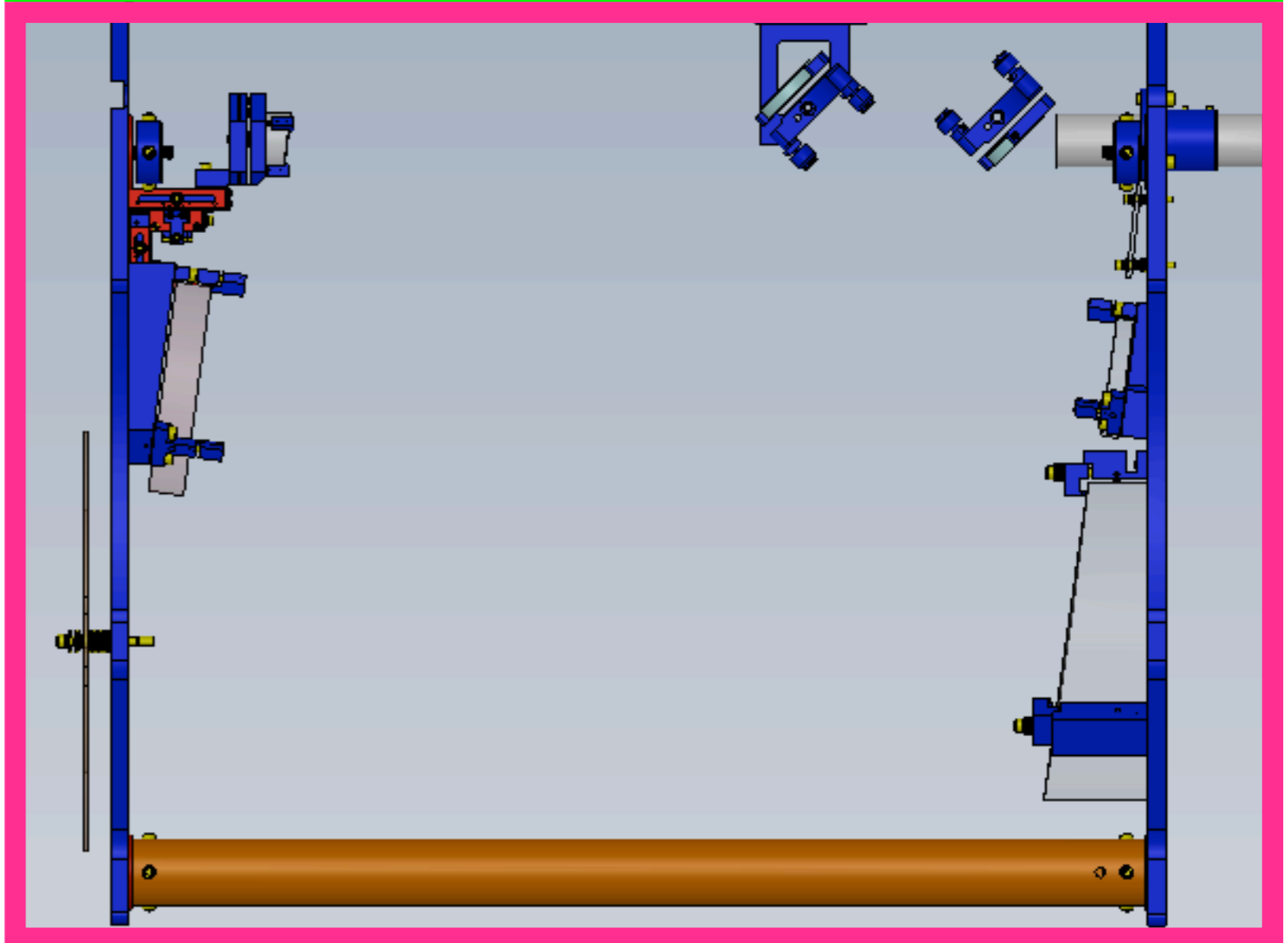
Green QPDs

BeamDiverter / BeamDump

ISC



AOS



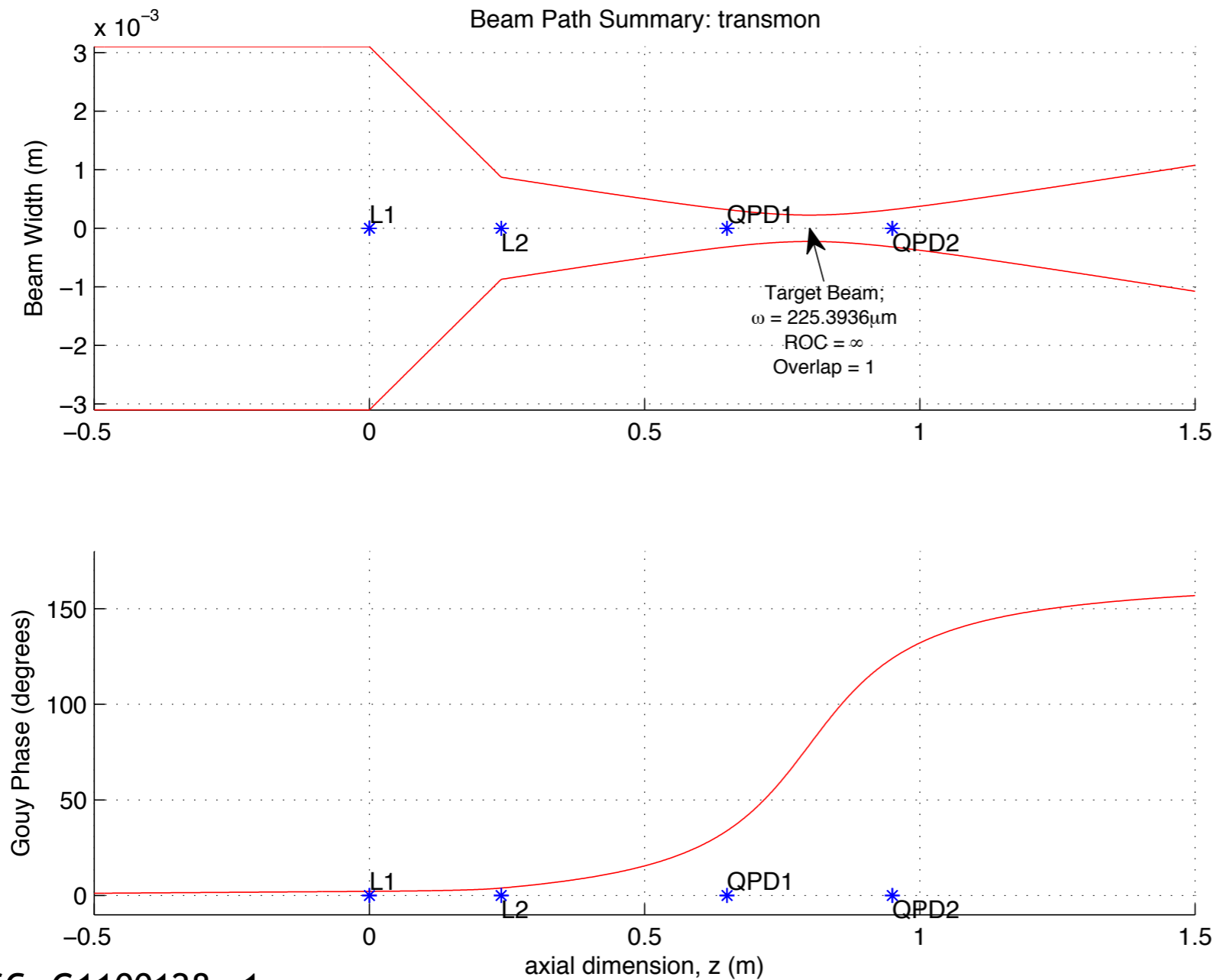
# Two QPD sleds

## 1. Position insensitive

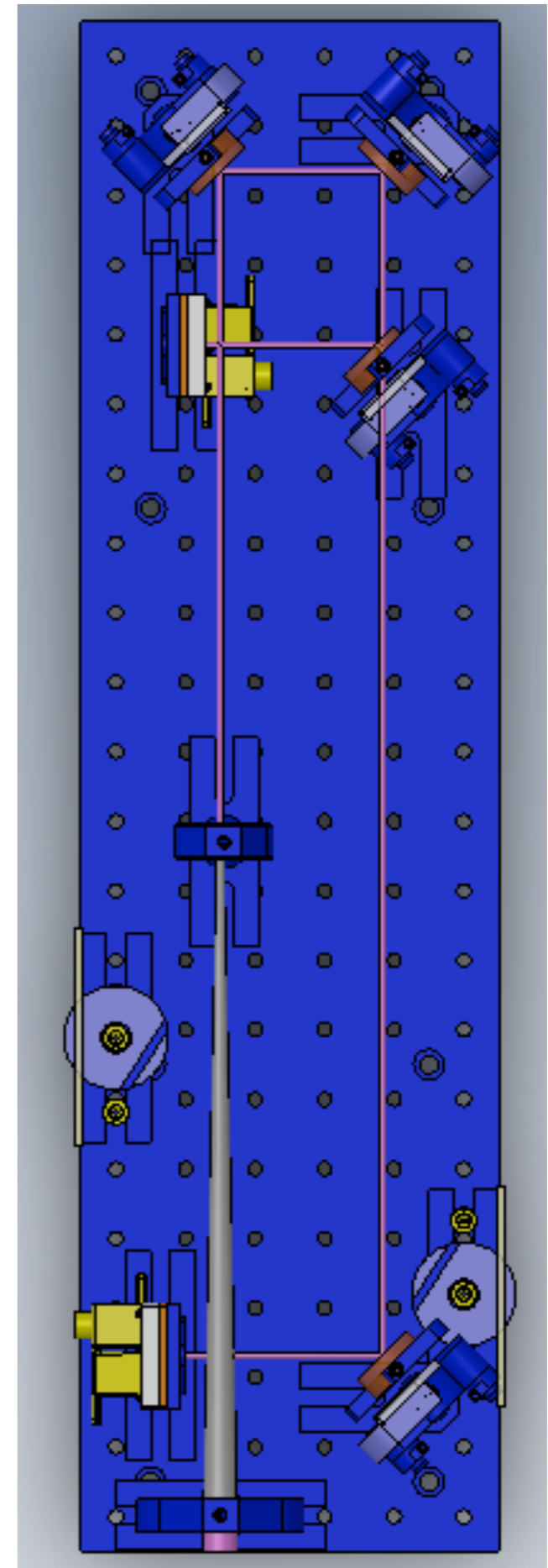
Input beam has  $Z_R = 28\text{m}$

Pre-aligned on lab bench

Pico motors in front of each QPD



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# Beam Diverter

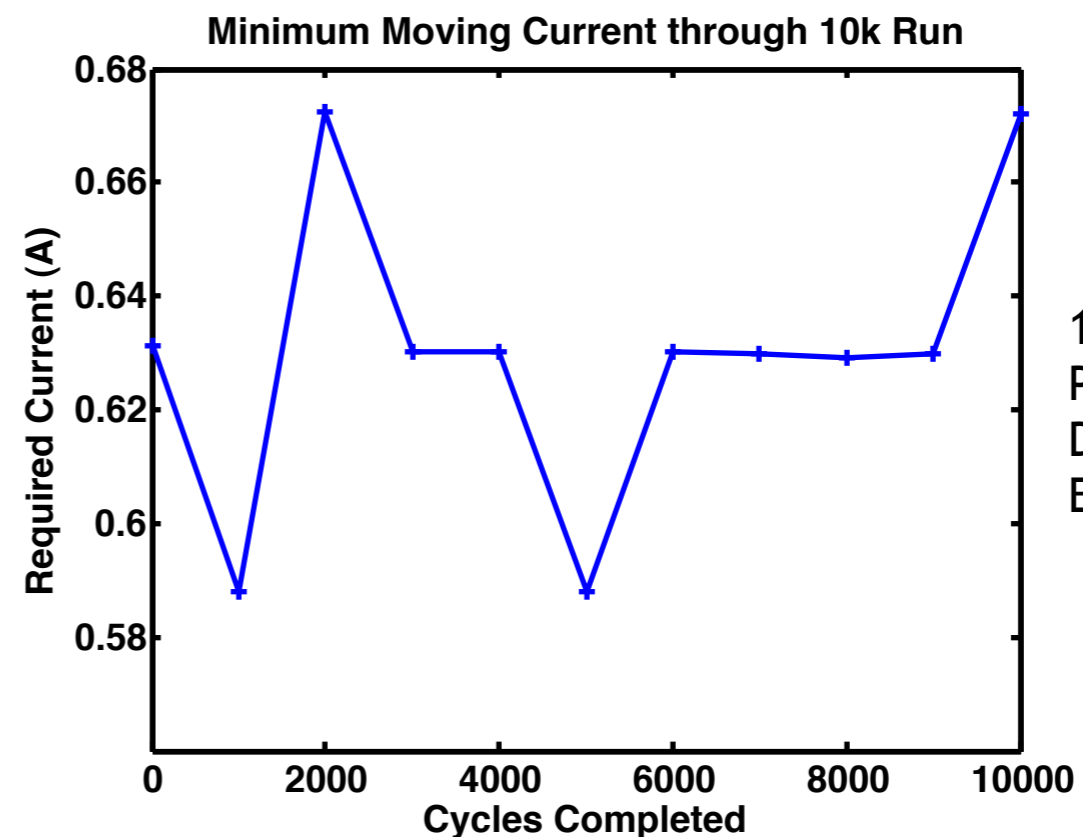
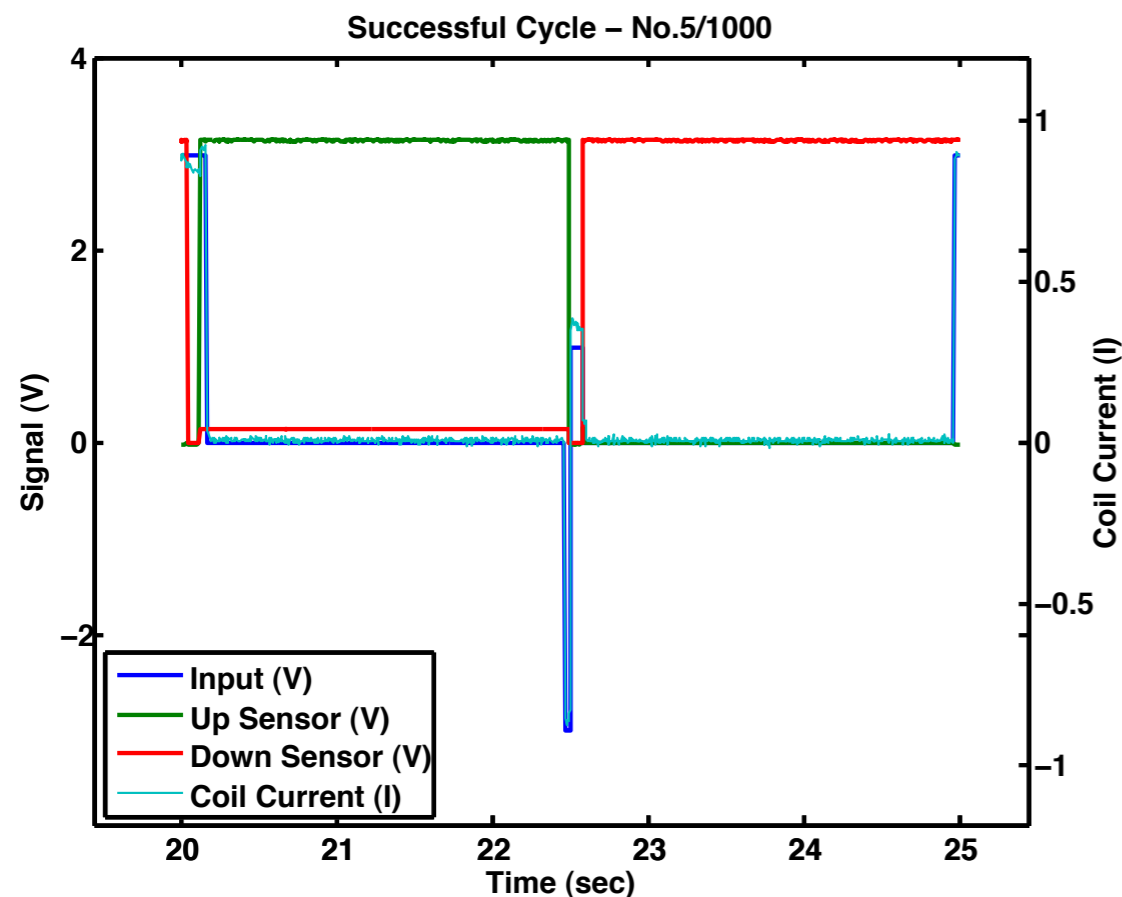
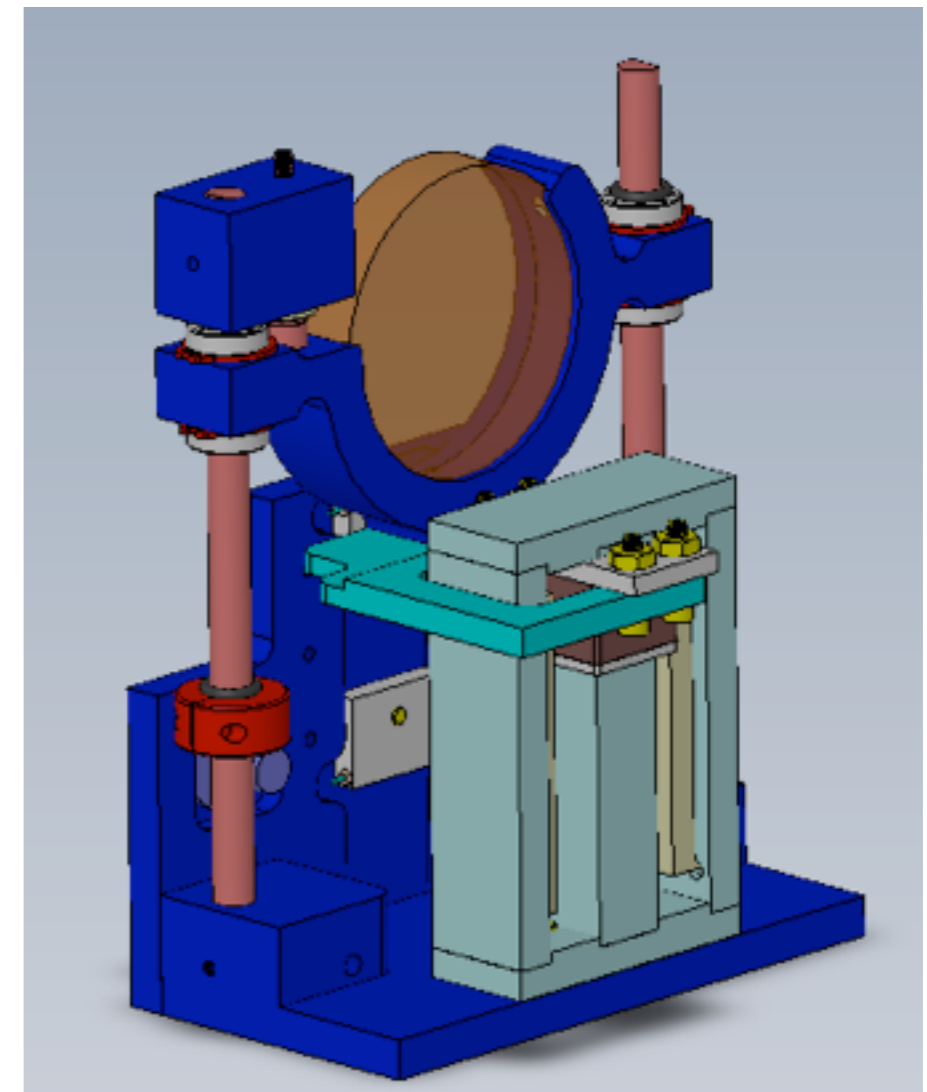
## 2. Block in-air beam during science mode

Requires ~10k cycles (estimated from # science mode segments)

No displacement of center of mass

Positive position sensing

Prototyping useful - found some problems



10k cycles  
PEEK bearings  
Dirty  
Eric Quintero

# Beam dump

## 3. 5 Watt beam dump

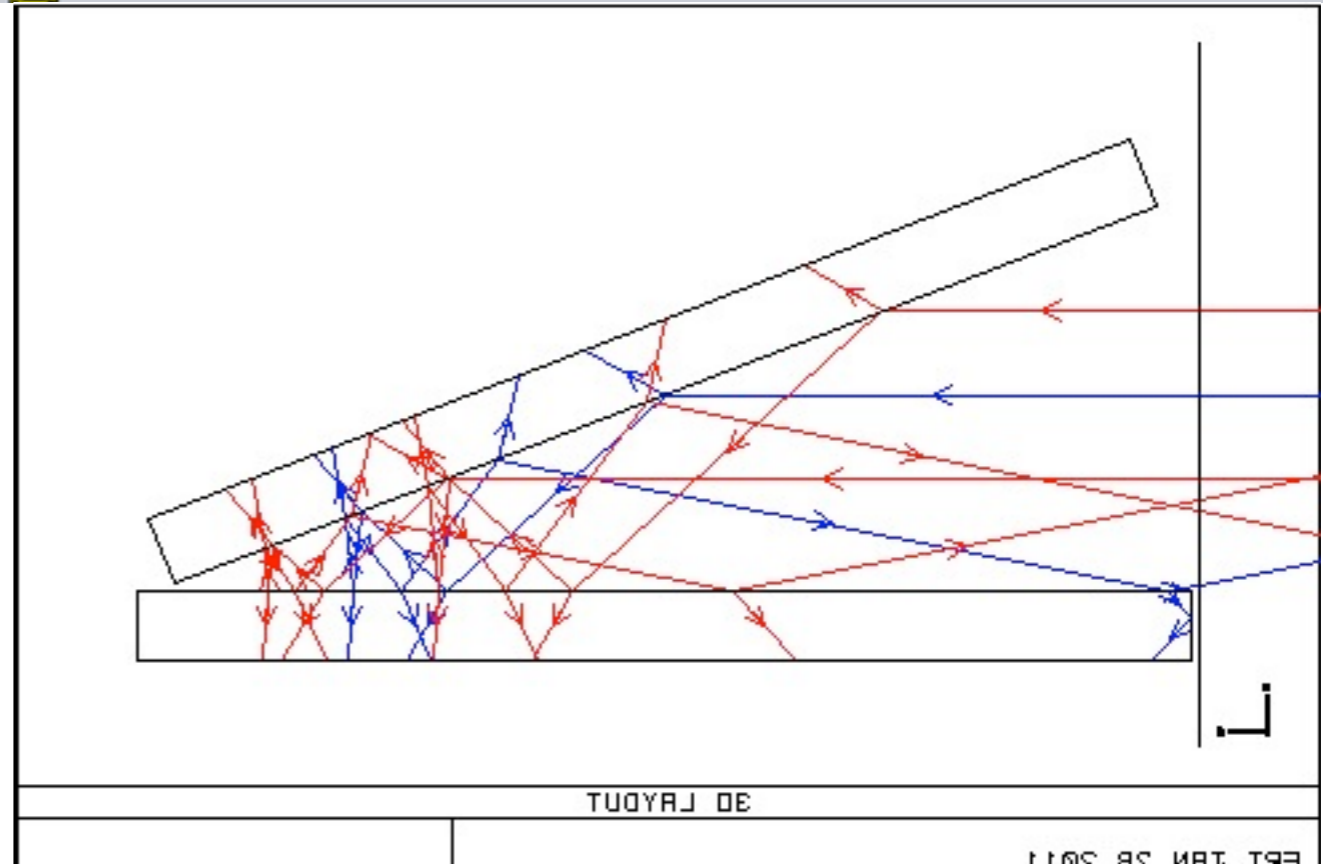
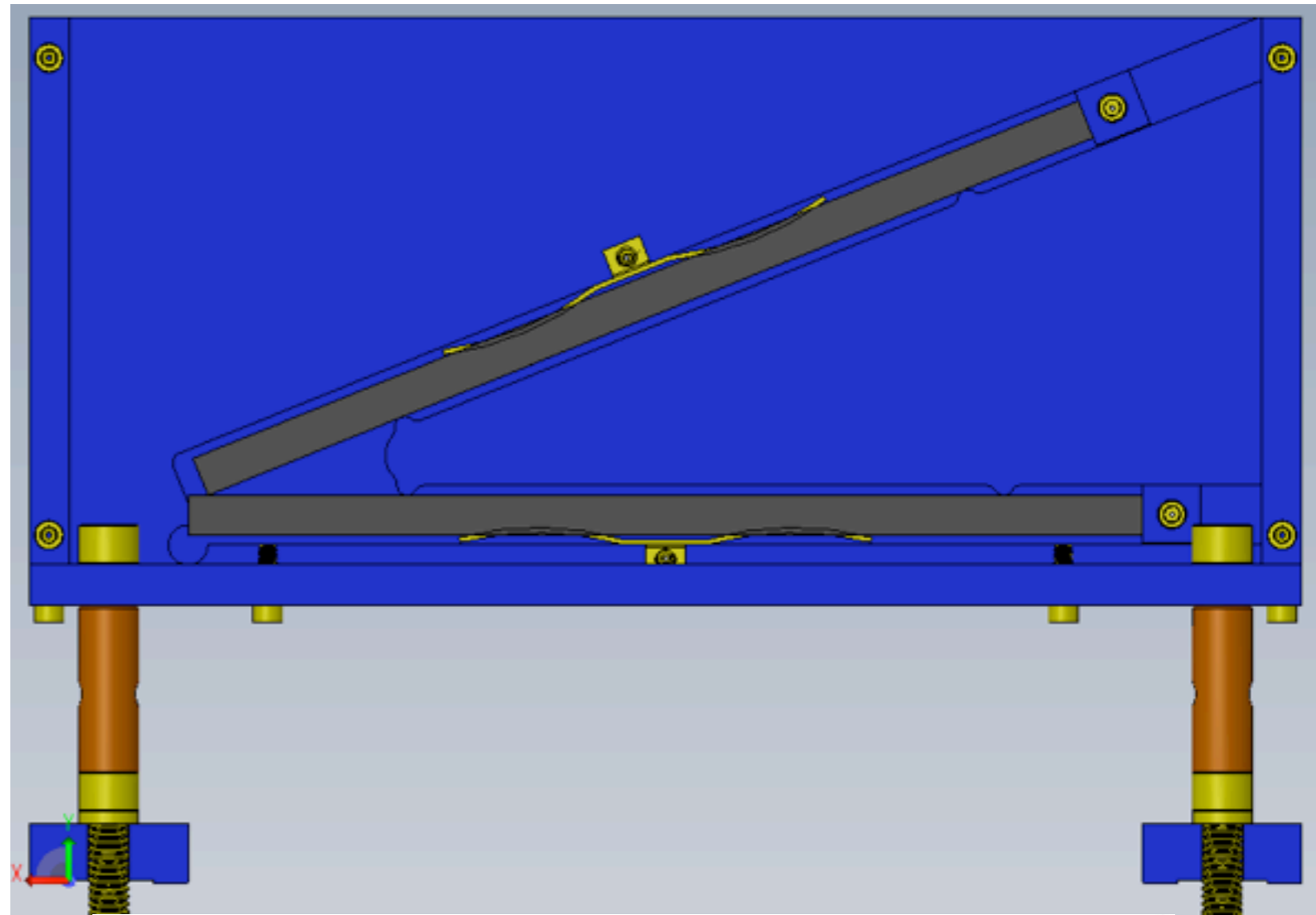
Low scattering: R should be  $< 4 \times 10^{-4}$  to keep  $x_{sc}/x_{ifo} < 0.1$  at 10Hz

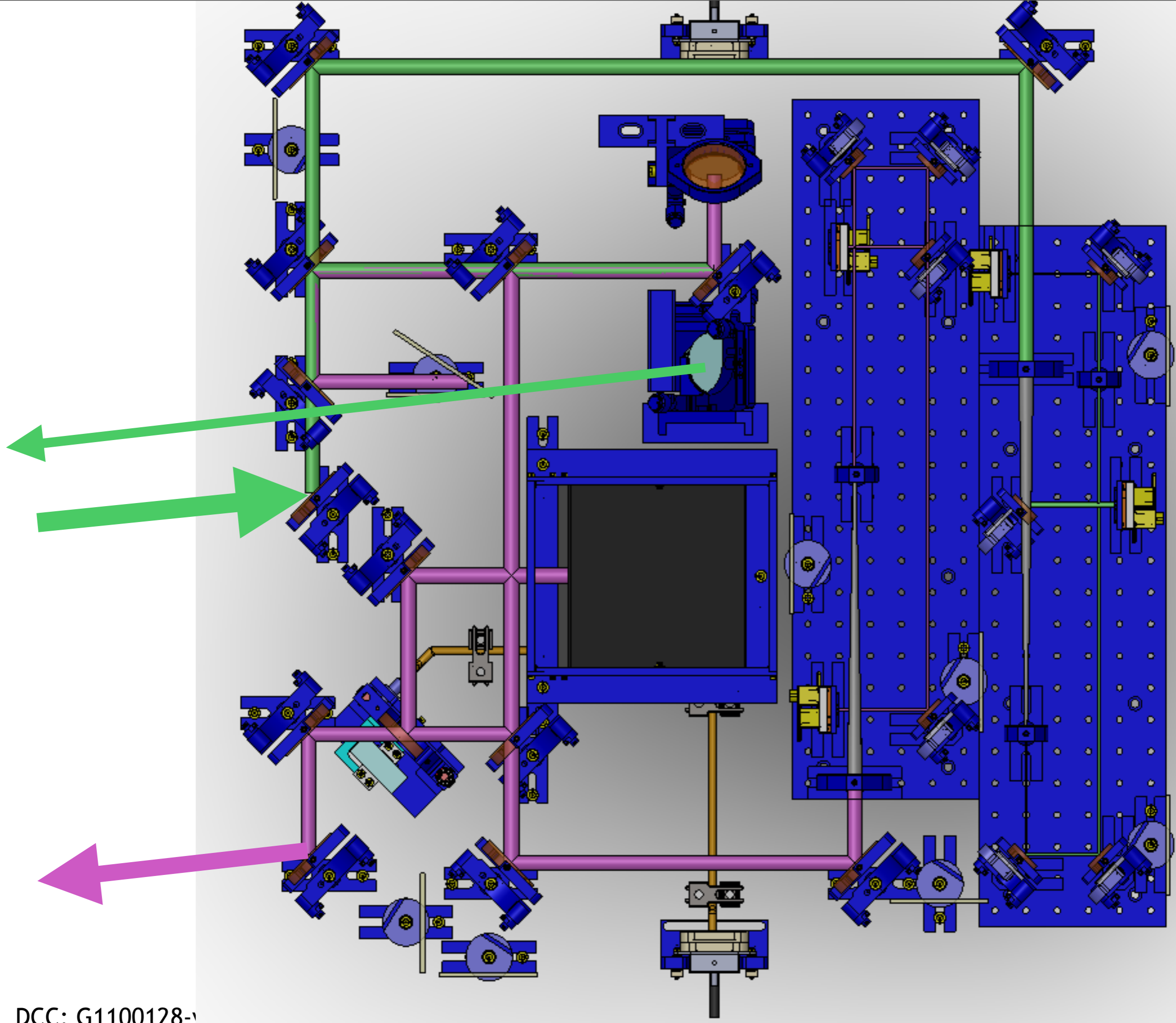
High power: Silicon Carbide

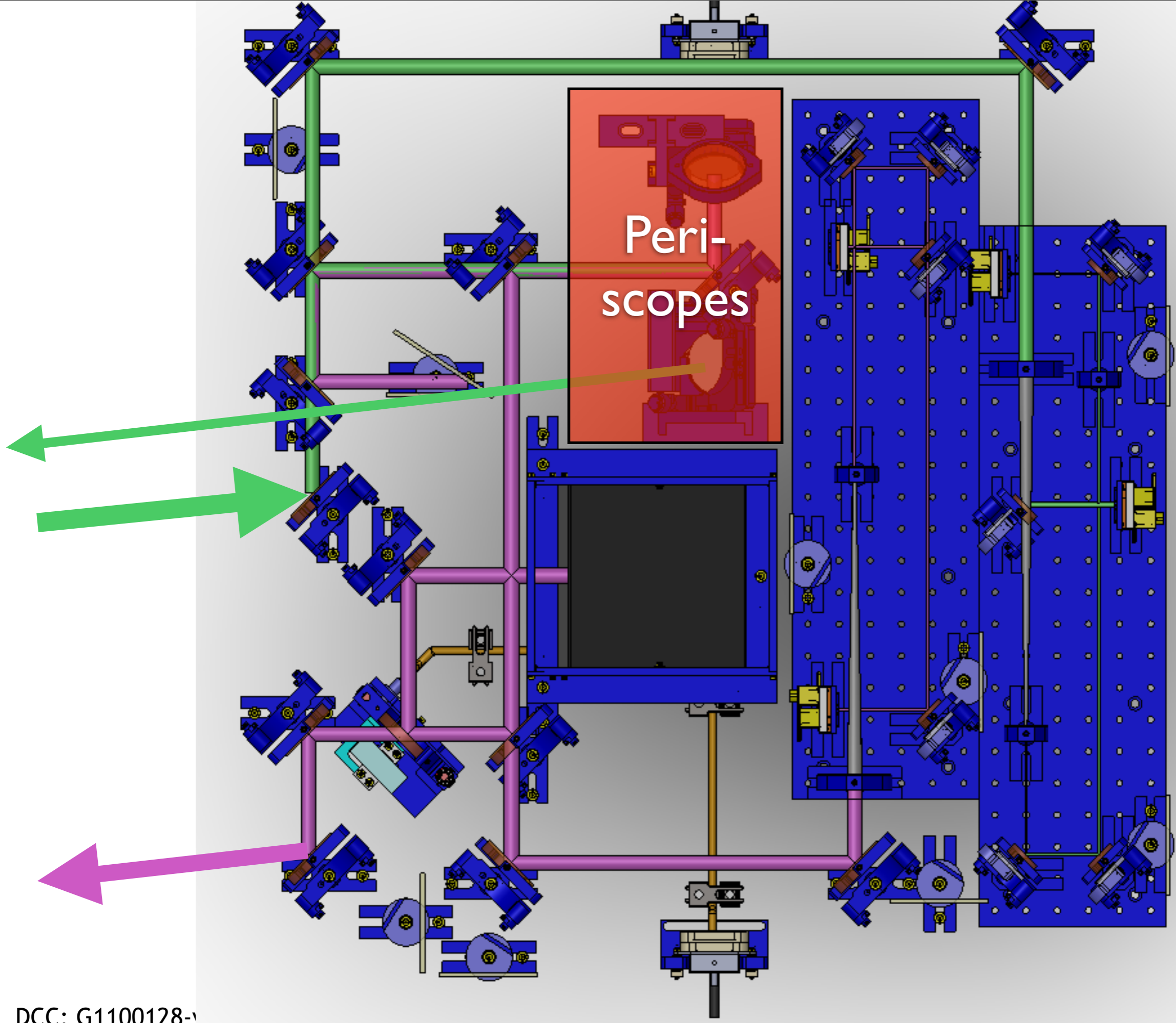
Ceramic legs isolate table from conduction

6"x6" plates radiate power away from the table - 0.25 W radiate down

Plate heats to 40 C with 5W input

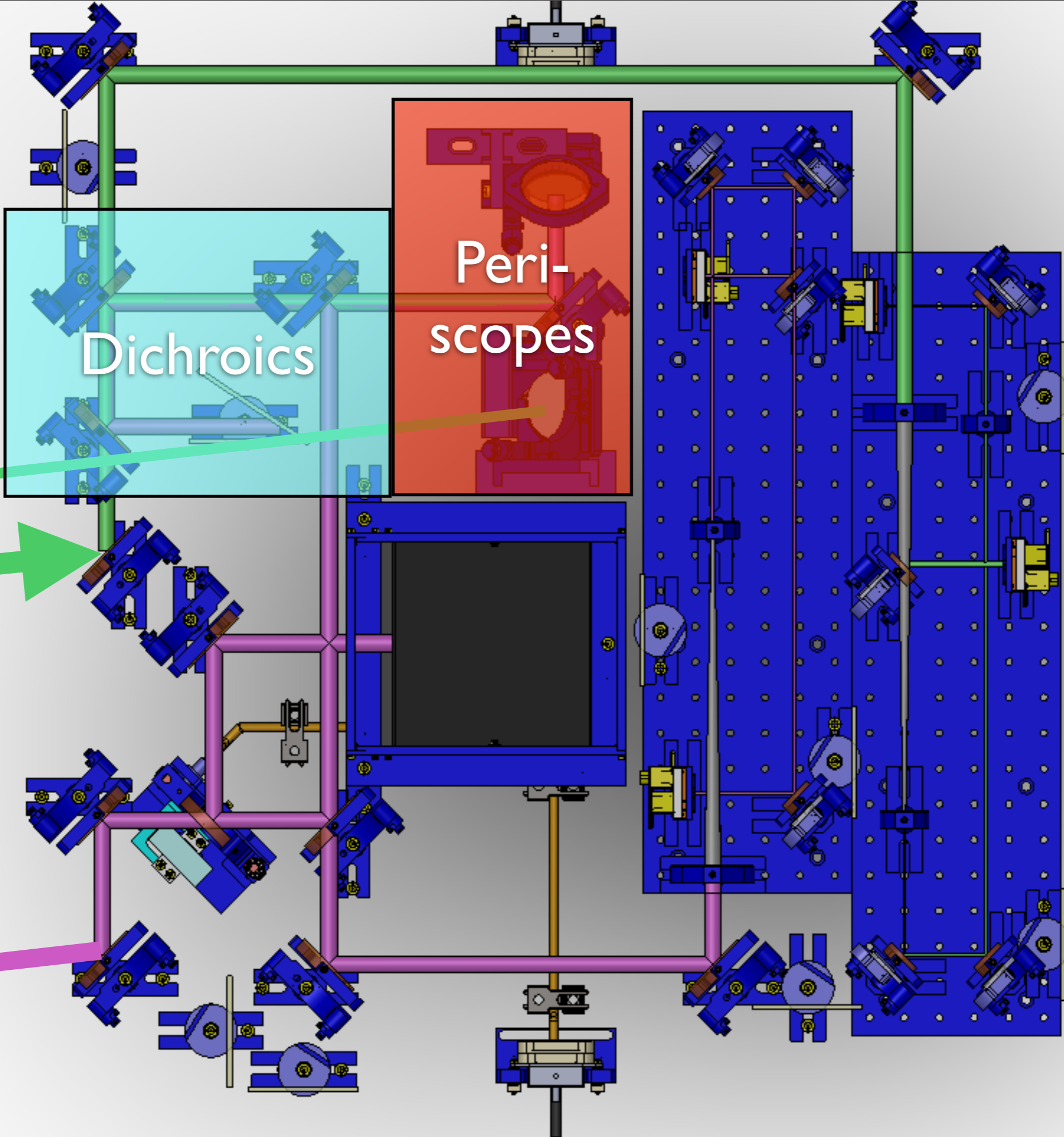






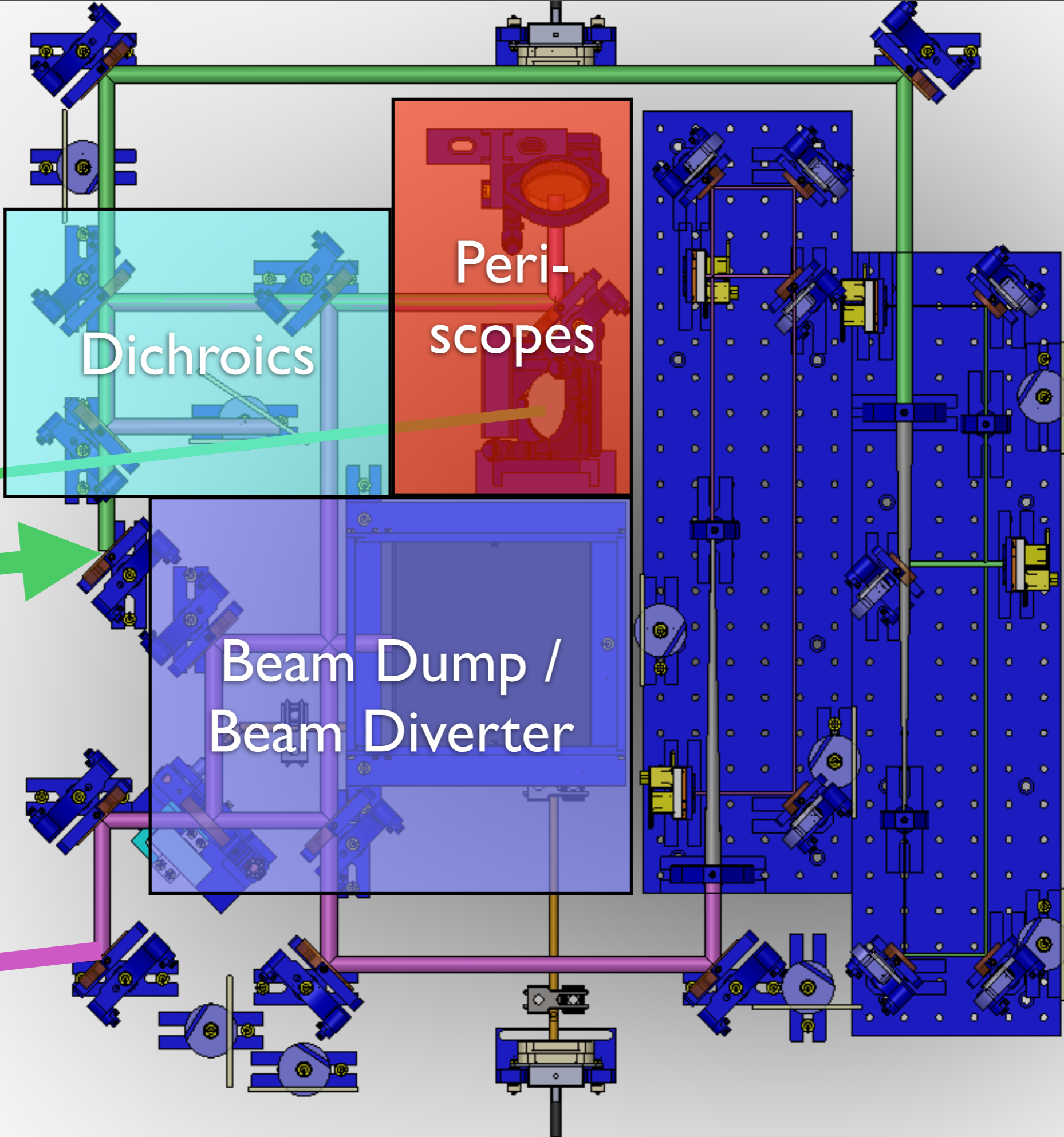
Peri-  
scopes

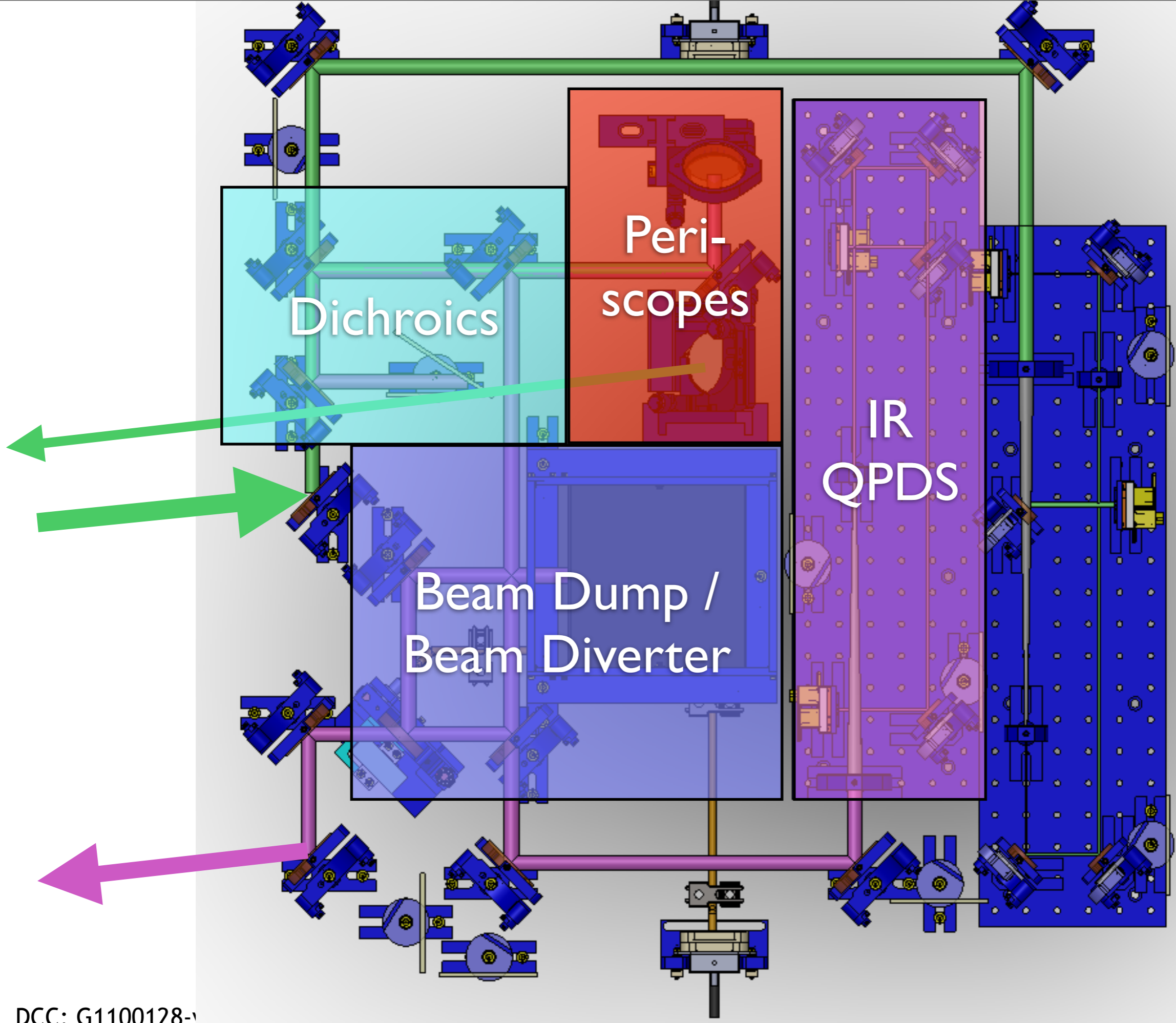


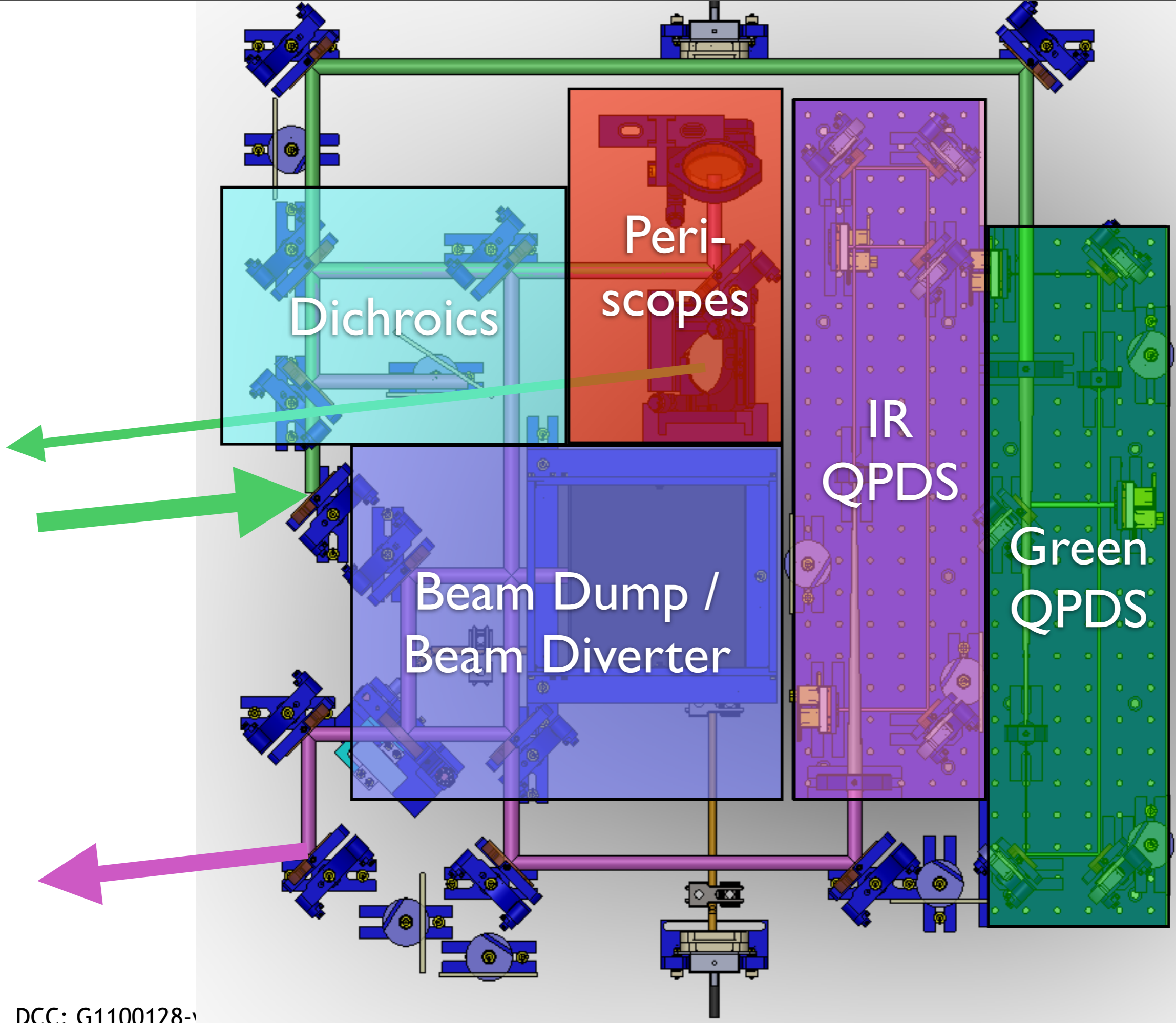


Dichroics

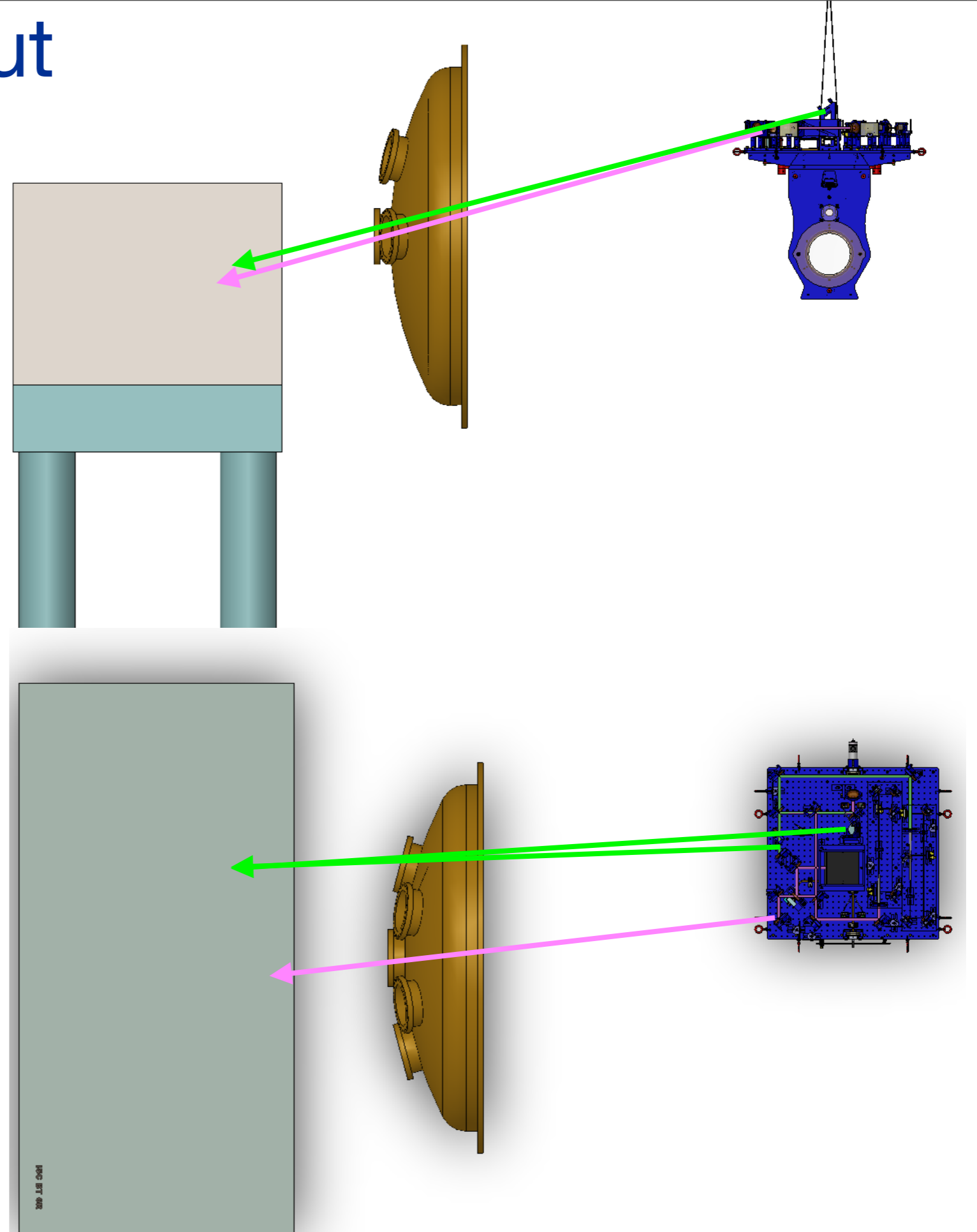
Peri-  
scopes







# Viewports and layout



# ISC Status

Item	Designed	Purchased	Received	Cleaned
Mirror Mounts	X	X		X
Bases / Posts	X	X	X	
Beam Dump	X	prototype		
Beam Diverter	X	prototype	prototype	
Optics	X	Lisa		
Black glass	X			
Pico Motors	X	X	X	
QPD mounts	X	X		
Cables/Connectors	X	X		

# Transmon suspension

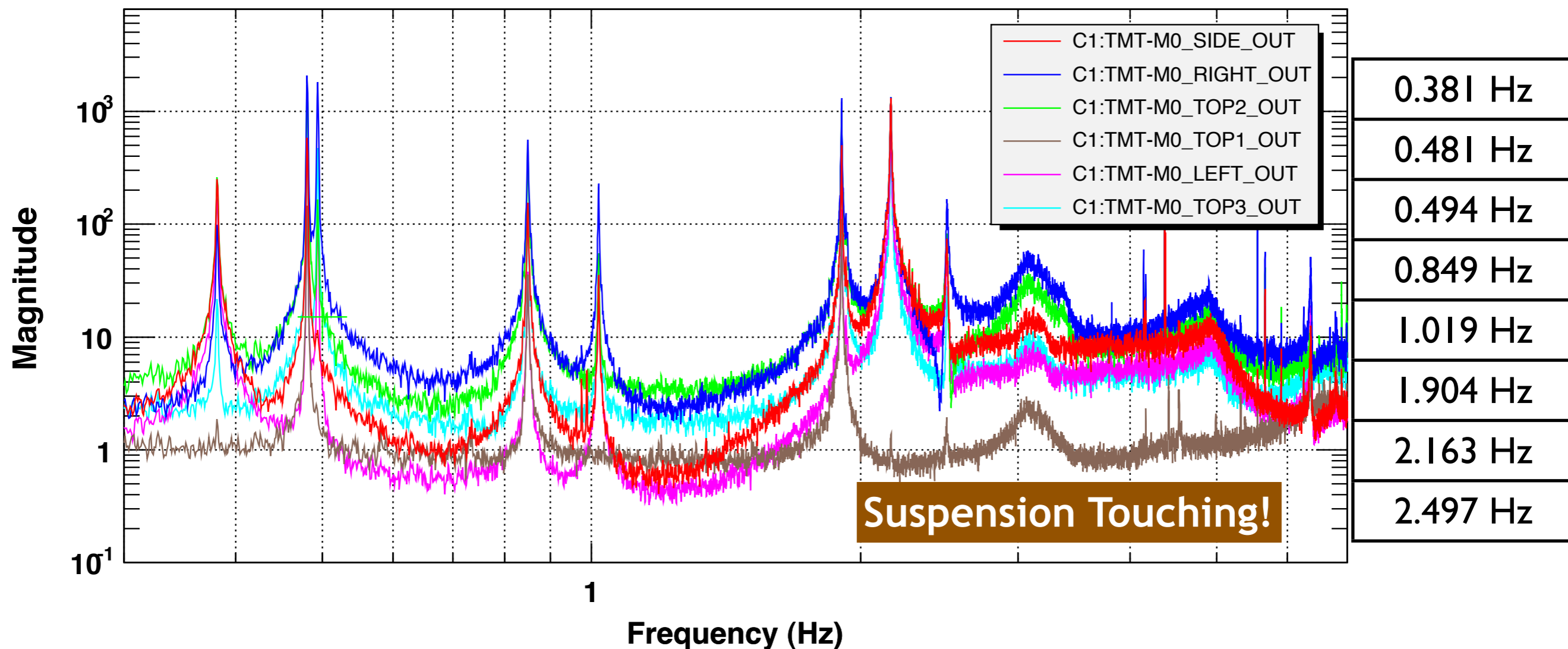
## 4. Hanging with dummy mass in Downs

Moments of inertia not matched

Spectra taken using BOSEMs, no transfer functions

B.Kells and K. Mailand

Power spectrum



T0=01/02/2011 02:01:11

Avg=20

BW=0.00146484

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# Transmon Telescope

## 1. Testing at Caltech

Problem with the coatings on primary and secondary

Going out for second vendor

Focused OAP-Spherical as designed

OAP-OAP required 2 cm shift

Effort focused on astigmatism

Not yet integrated with mechanics

V. Sannbale & M. Smith

