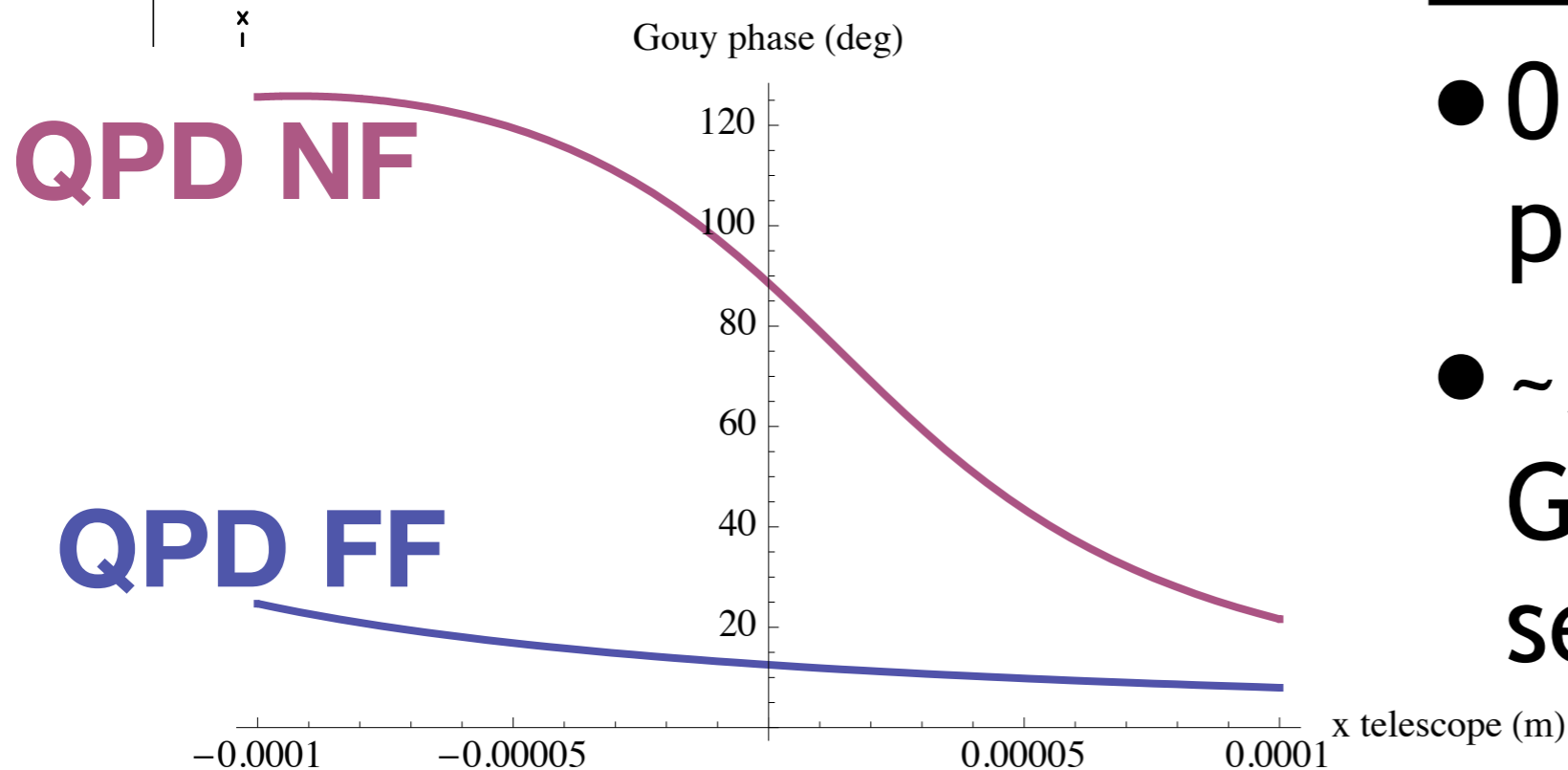
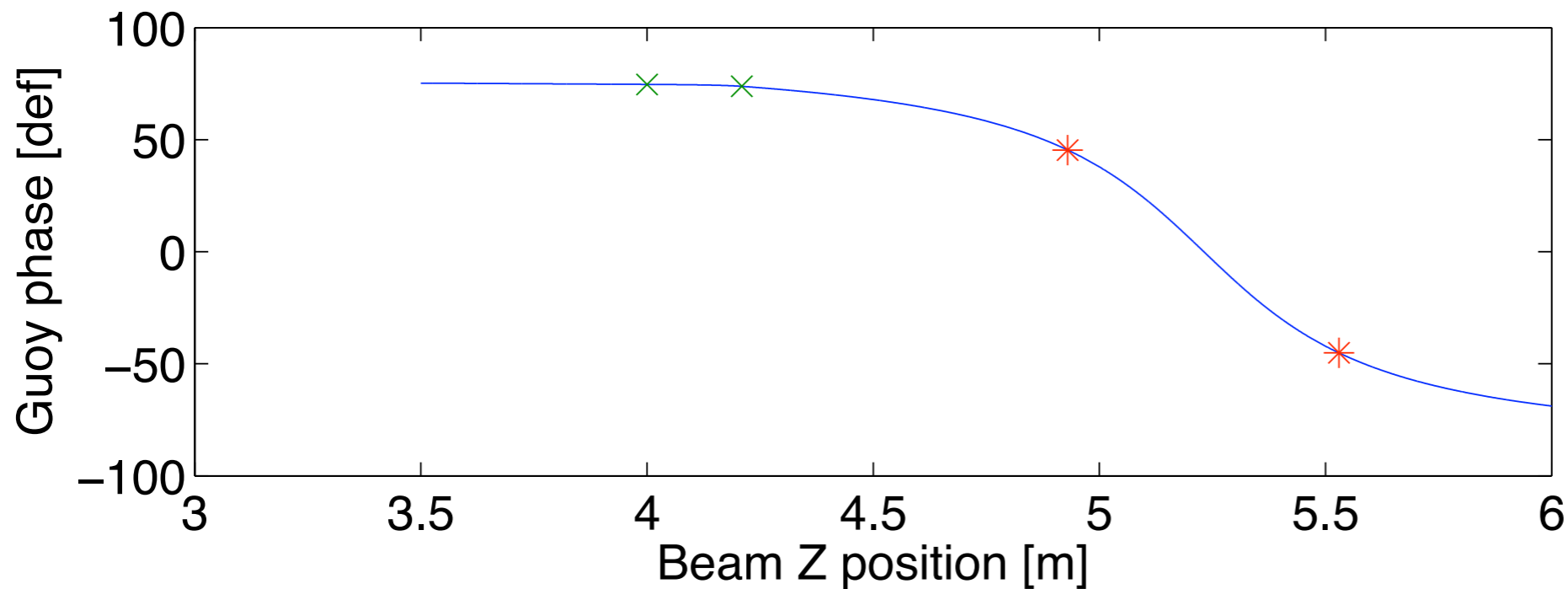
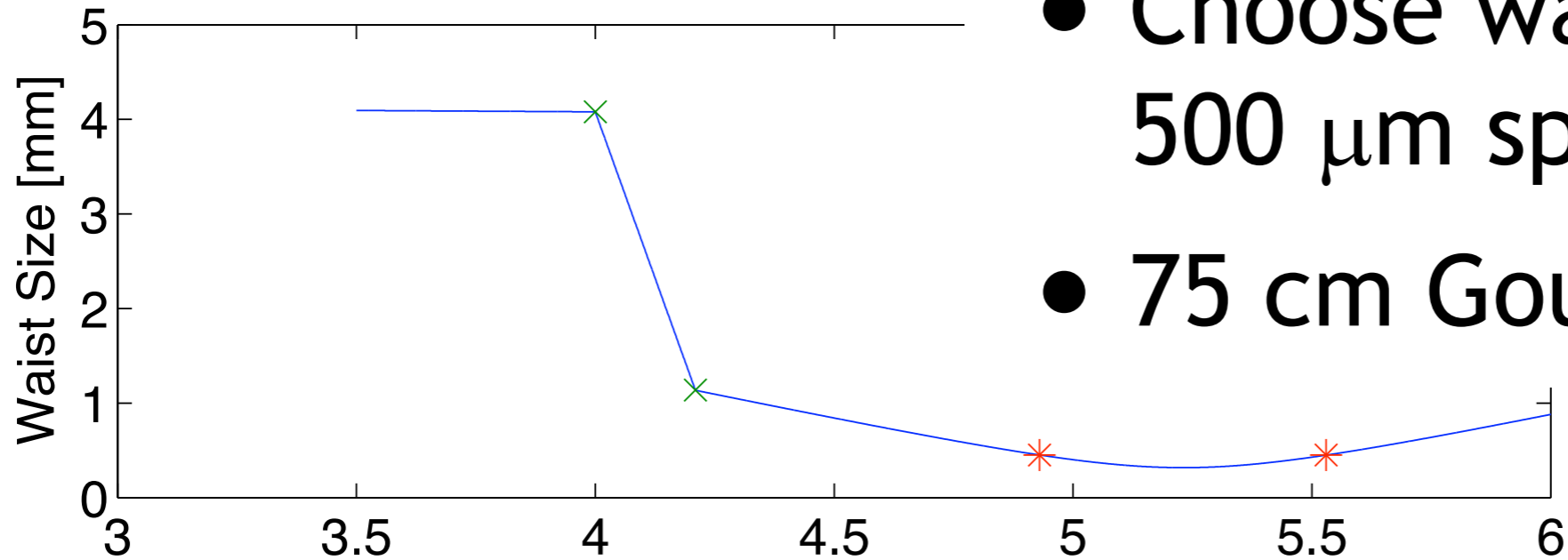


Before:

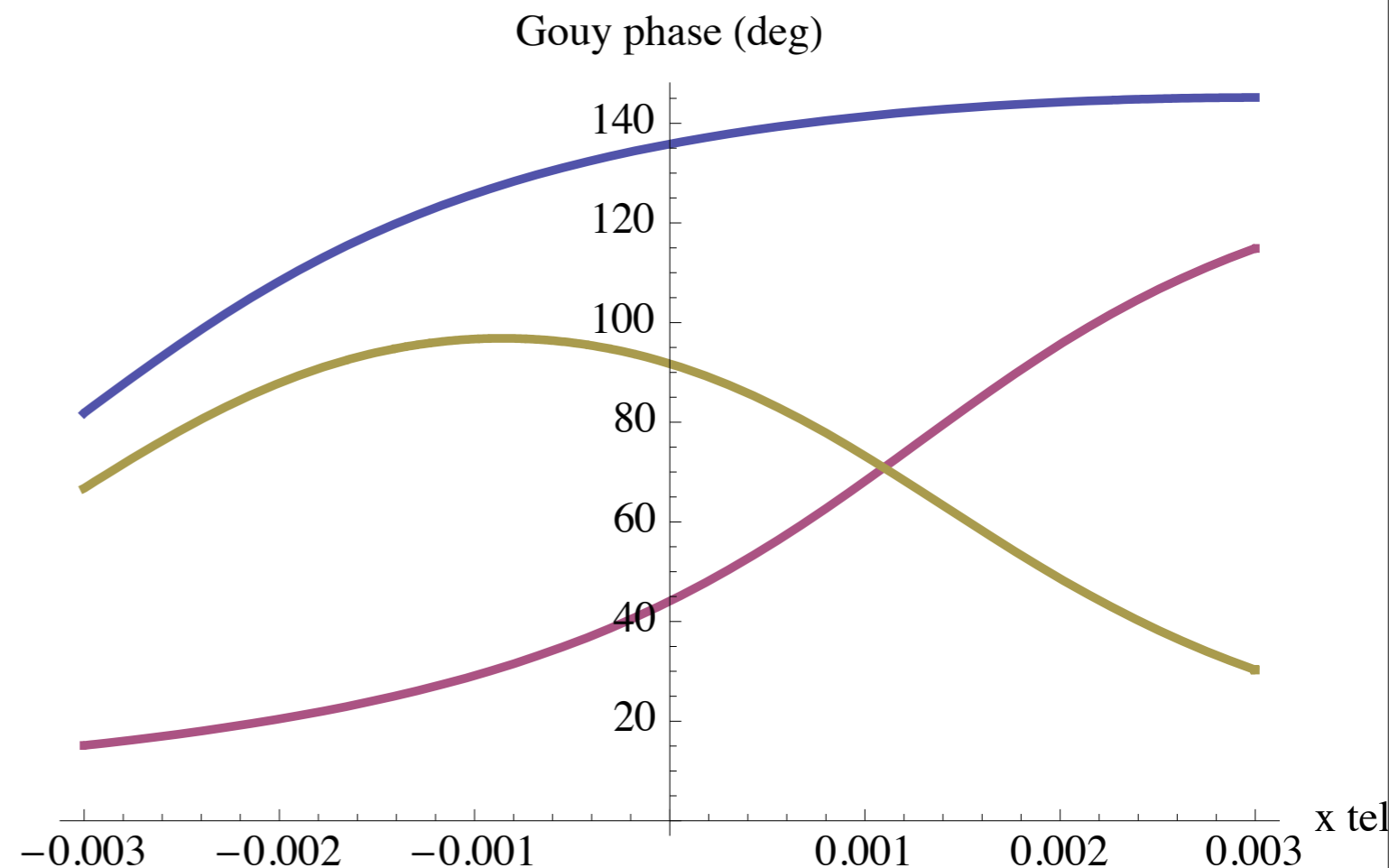
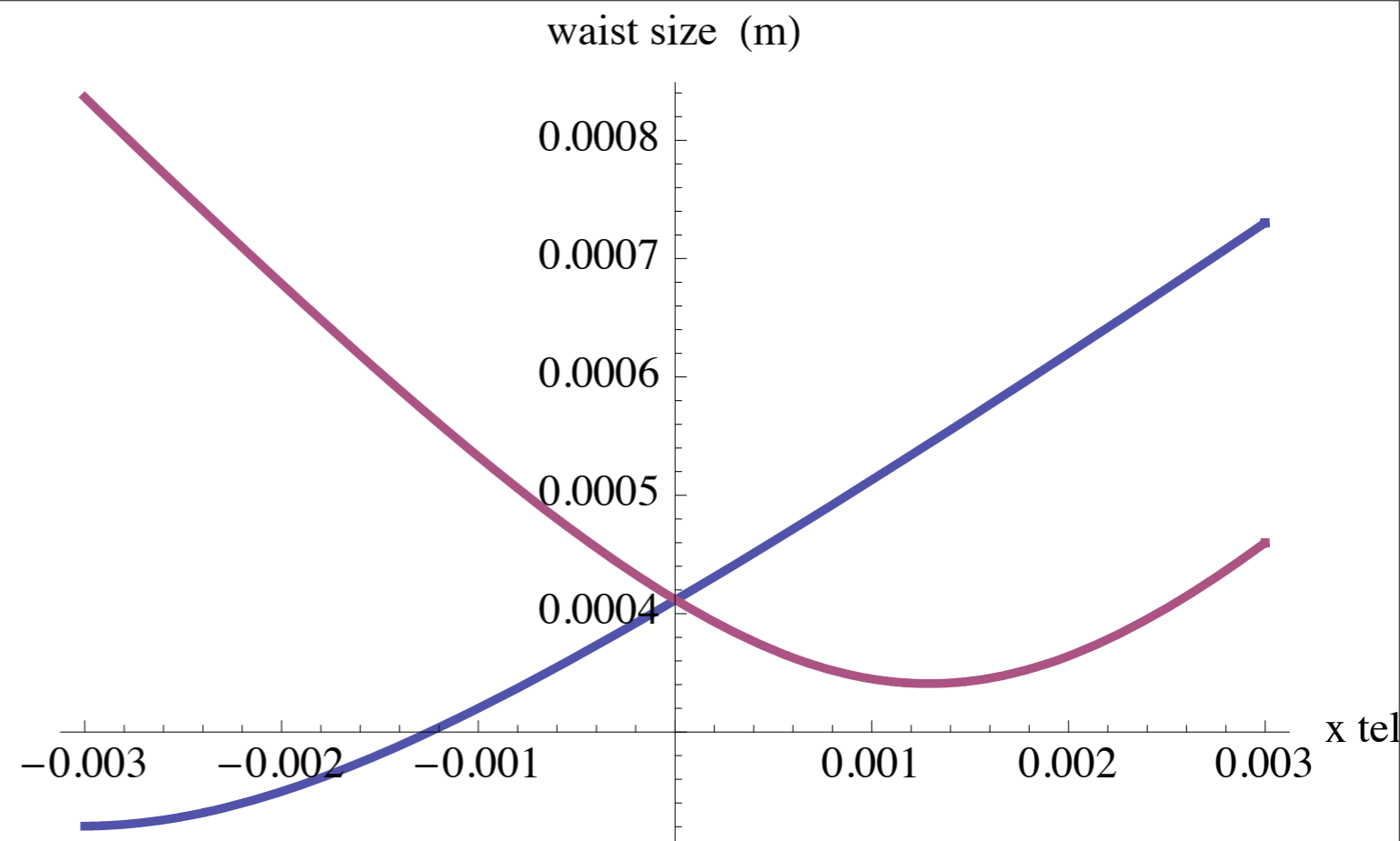
- 0.5 m 15:1 off-axis parabolic telescope
- ~50 μm length to Gouy phase sensitivity

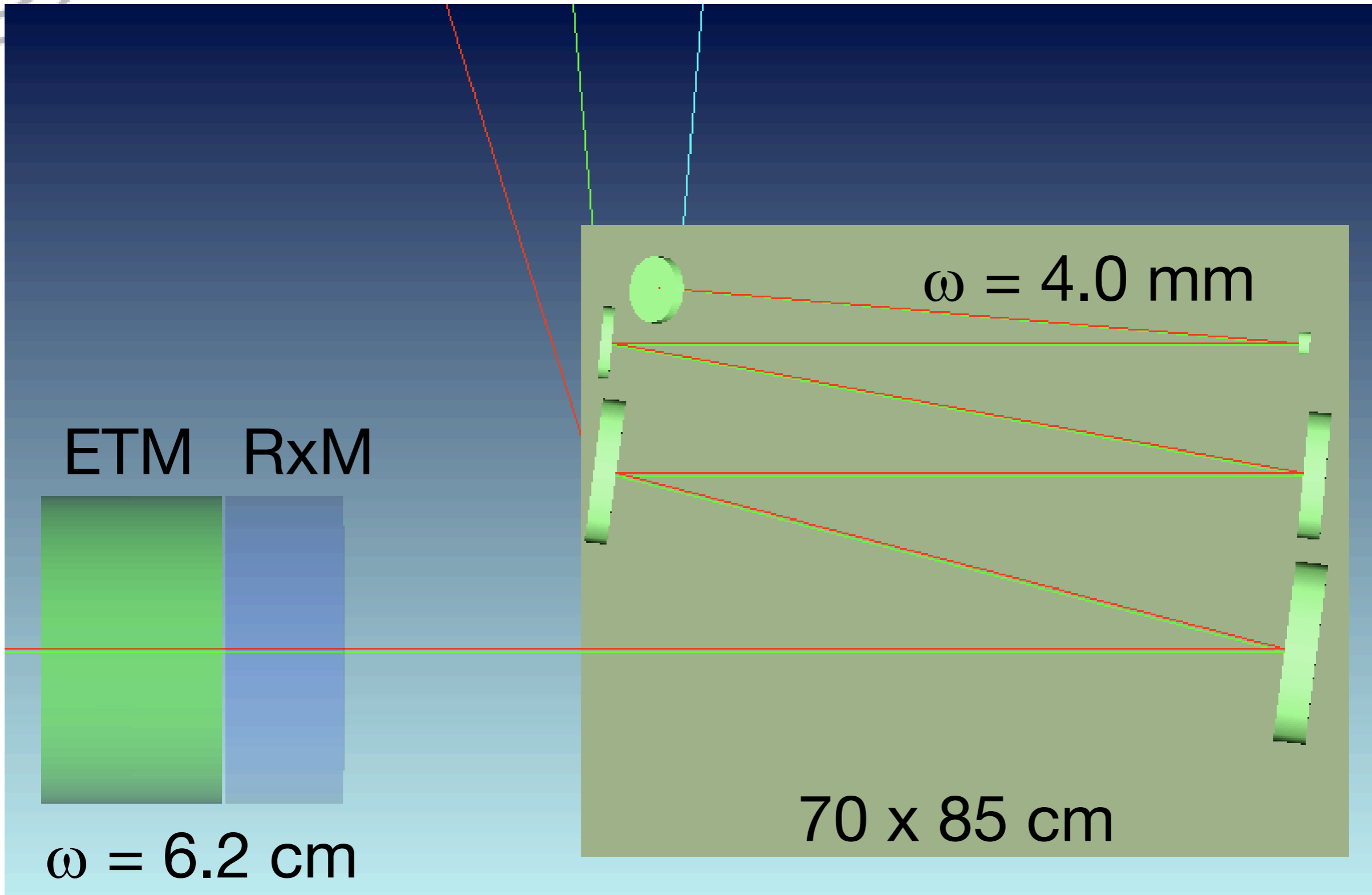


- Set QPDs symmetrically about waist at Z_R
- Choose waist size for $500\ \mu\text{m}$ spot at QPD
- 75 cm Gouy telescope



- Gouy telescope much less sensitive to beam reduction: ± 2 mm range
- Also a function of the slower beam reducing telescope





Magic QPD Sled

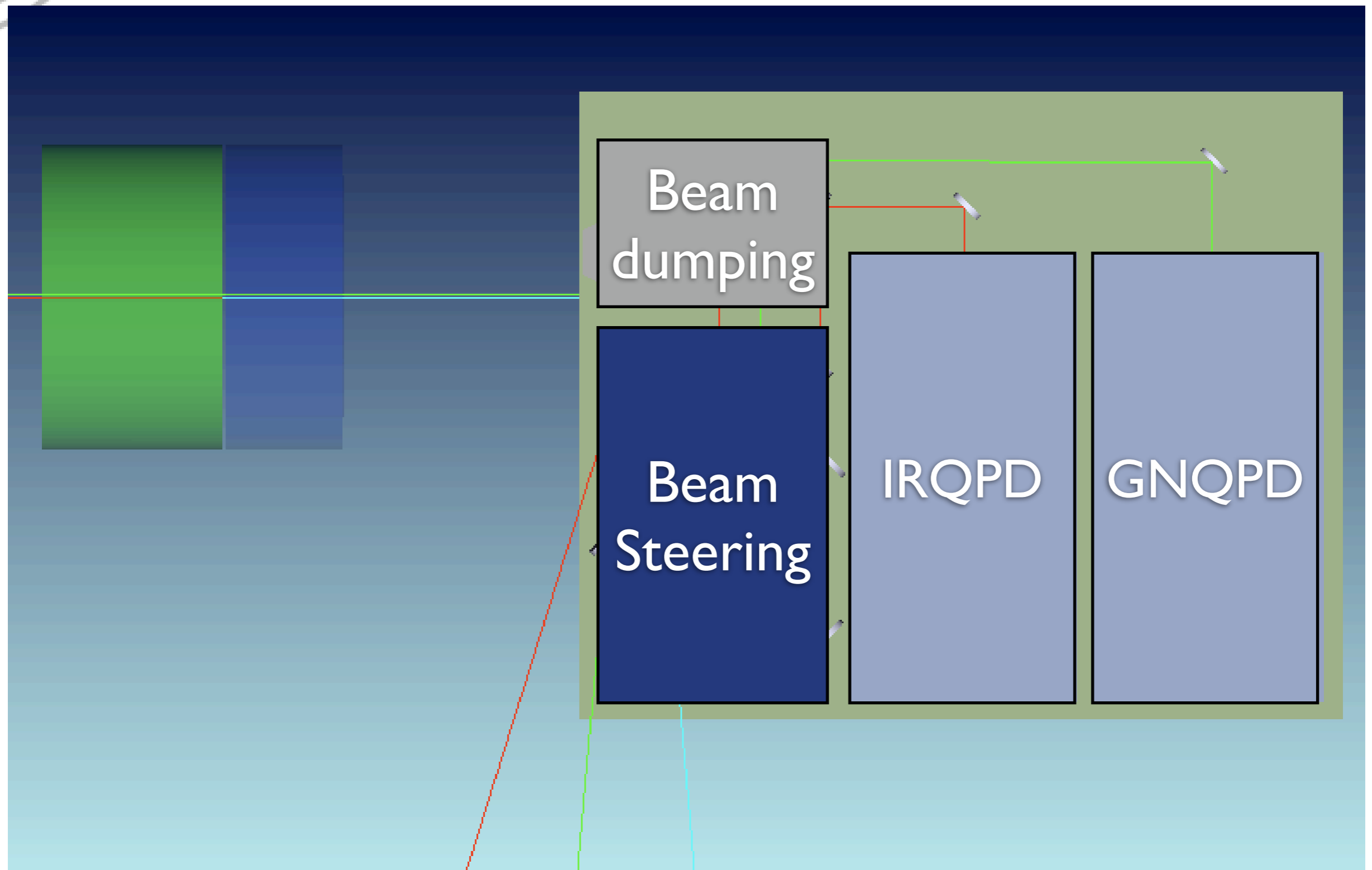
- Fixed Gouy telescope
- Takes 4mm input, insensitive to spacing from BRT
- Pre-aligned in lab, then installed on transmon table
- Independent of specific lenses

QPD1

$f1 \sim 229 \text{ mm}$

$f2 \sim 47 \text{ mm}$

QPD2



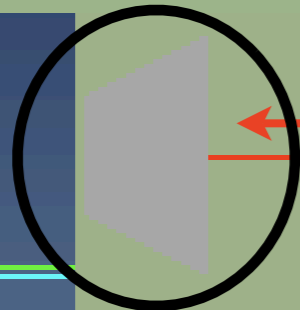
IR

Green

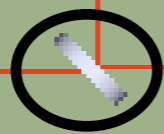
Hartmann

IR beam path

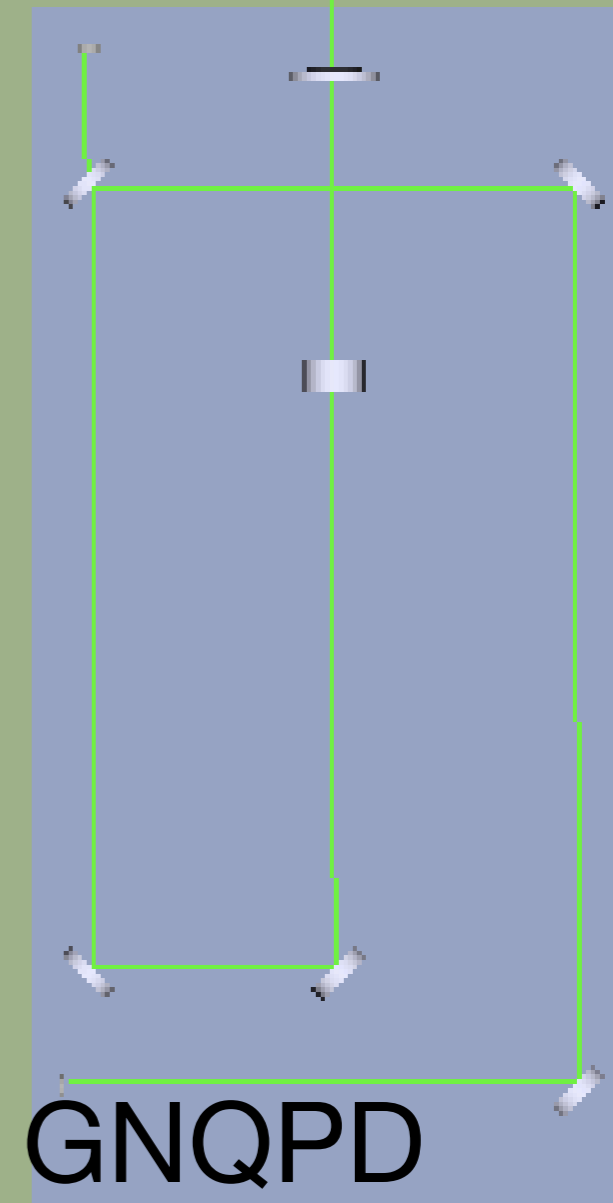
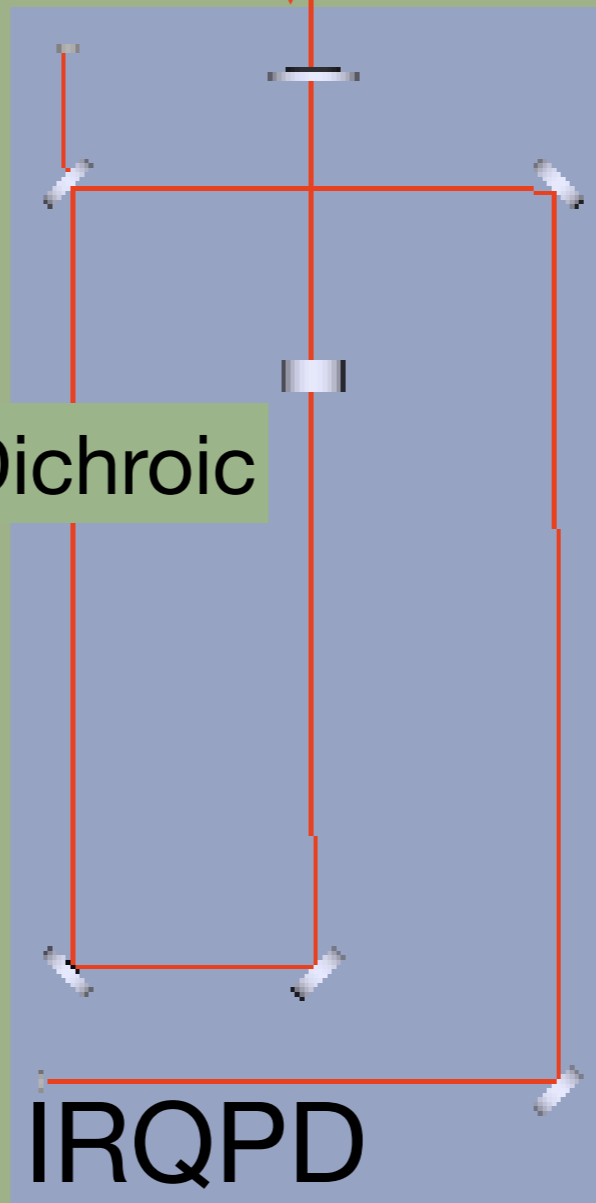
Beam dump



flipper



Dichroic



IRQPD

GNQPD

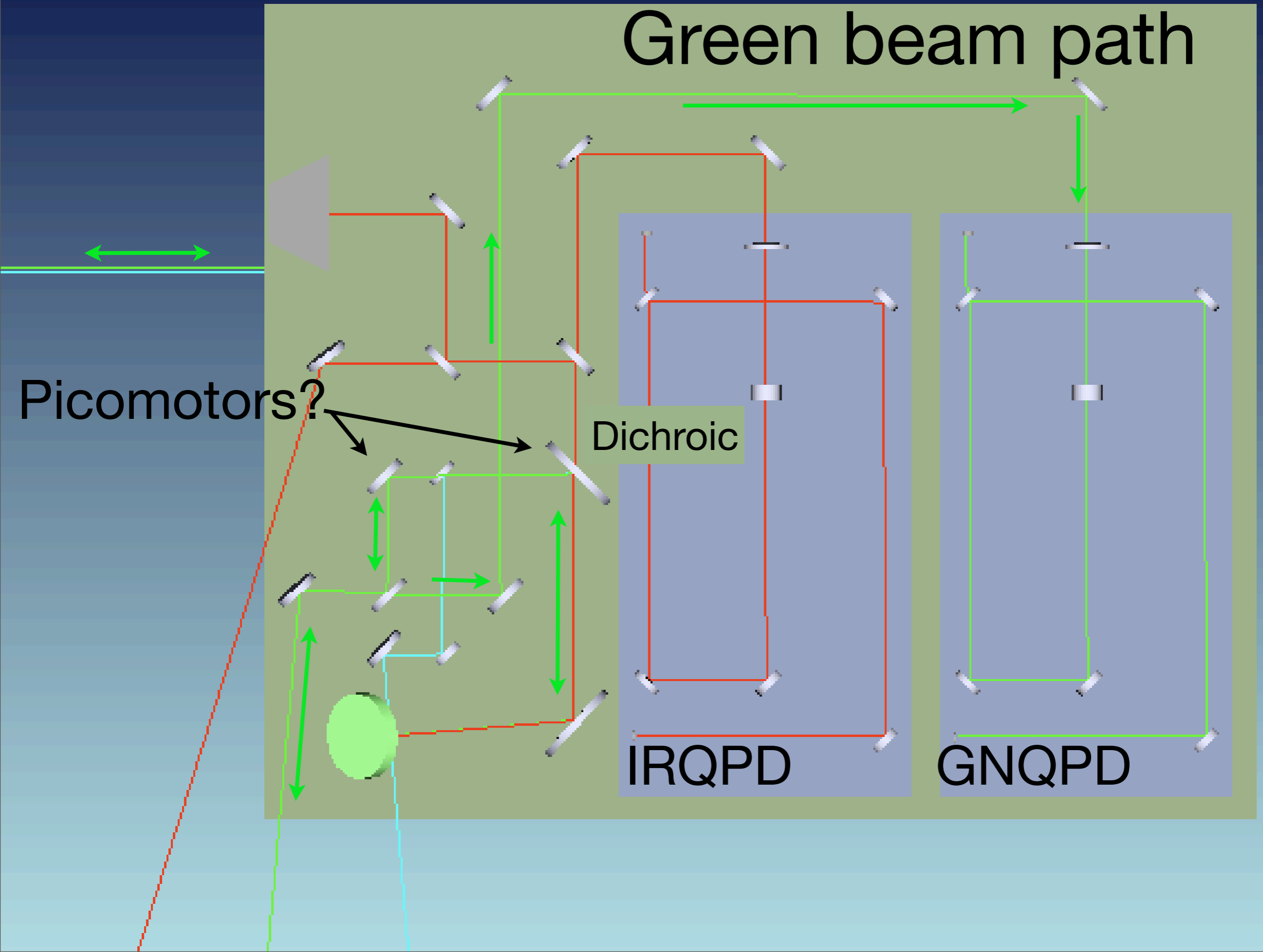
Green beam path

Picomotors?

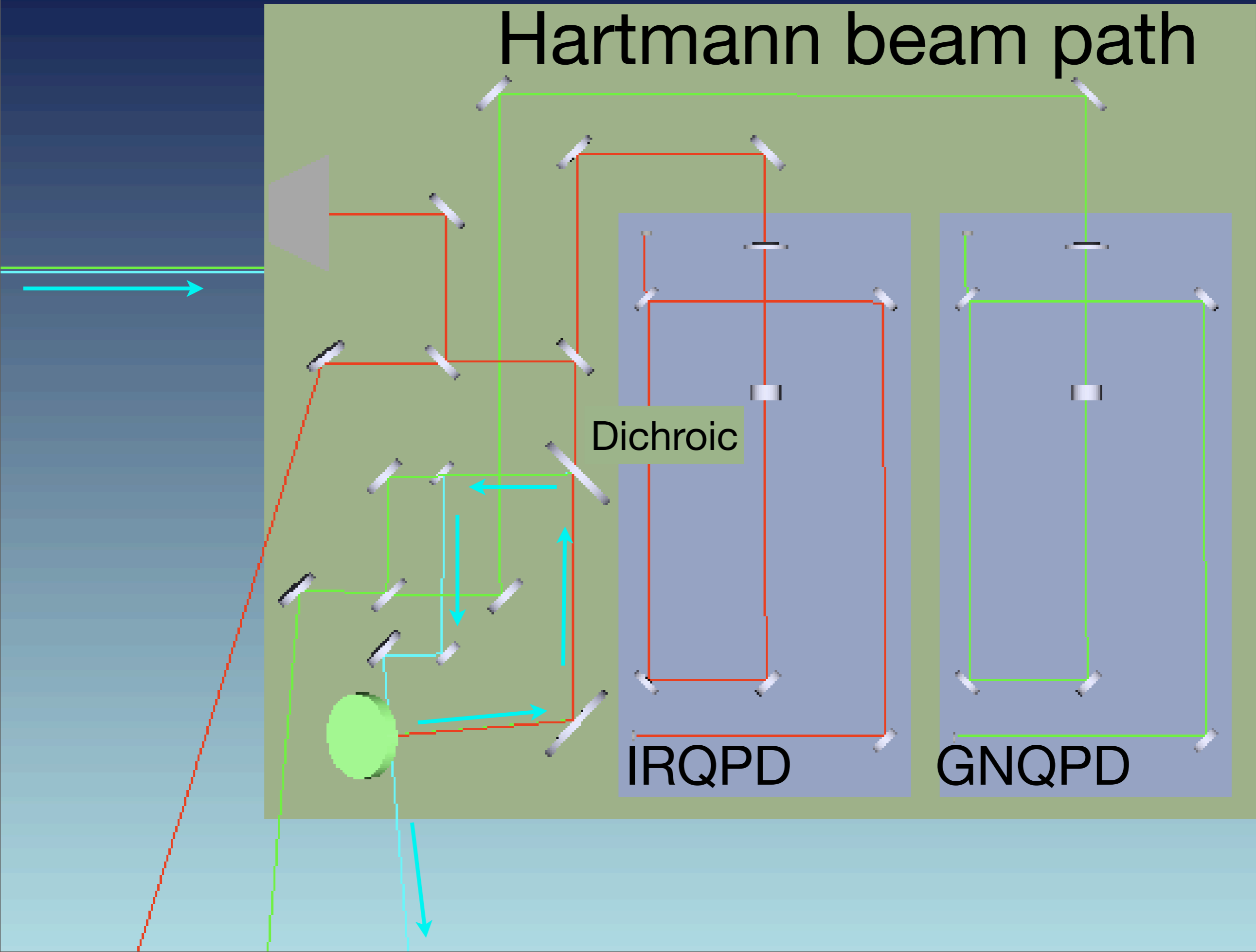
Dichroic

IRQPD

GNQPD



Hartmann beam path



Dichroic

IRQPD

GNQPD

To be determined

- 5 W in vacuum beam dump
- 2” flipper mirror for IR beam
- Relative steering IR to Green
- Specific Gouy telescope
- Hartmann beam separation
- Specify the dichroic
- Beam dumps, scattered light
- Actual mirror mounts, etc. for space constraints

Custom components

Vacuum compatible versions of:

◆ Beam dump

- ▶ Ken Mailand beam dump, re-engineer for vacuum

◆ Kinematic mirror mounts

- ▶ Clean actuator in a Newfocus (1") or CVI (2") mount
- ▶ Coated screws vs qualifying krytox

◆ Steerable mirror mounts

- ▶ Vac-compatible pico-motor?
- ▶ Could always use the Ultra at ~\$3k per axis

◆ Flipper mirror

- ▶ Sam to mock up a unit with rotary flex joints & magnet/coil drive

◆ Quadrant photodetector

- ▶ Rich is on it; aiming for beg-Aug to finish the design