

Rough Sketch of In-Vac PD and QPD Layout Plans

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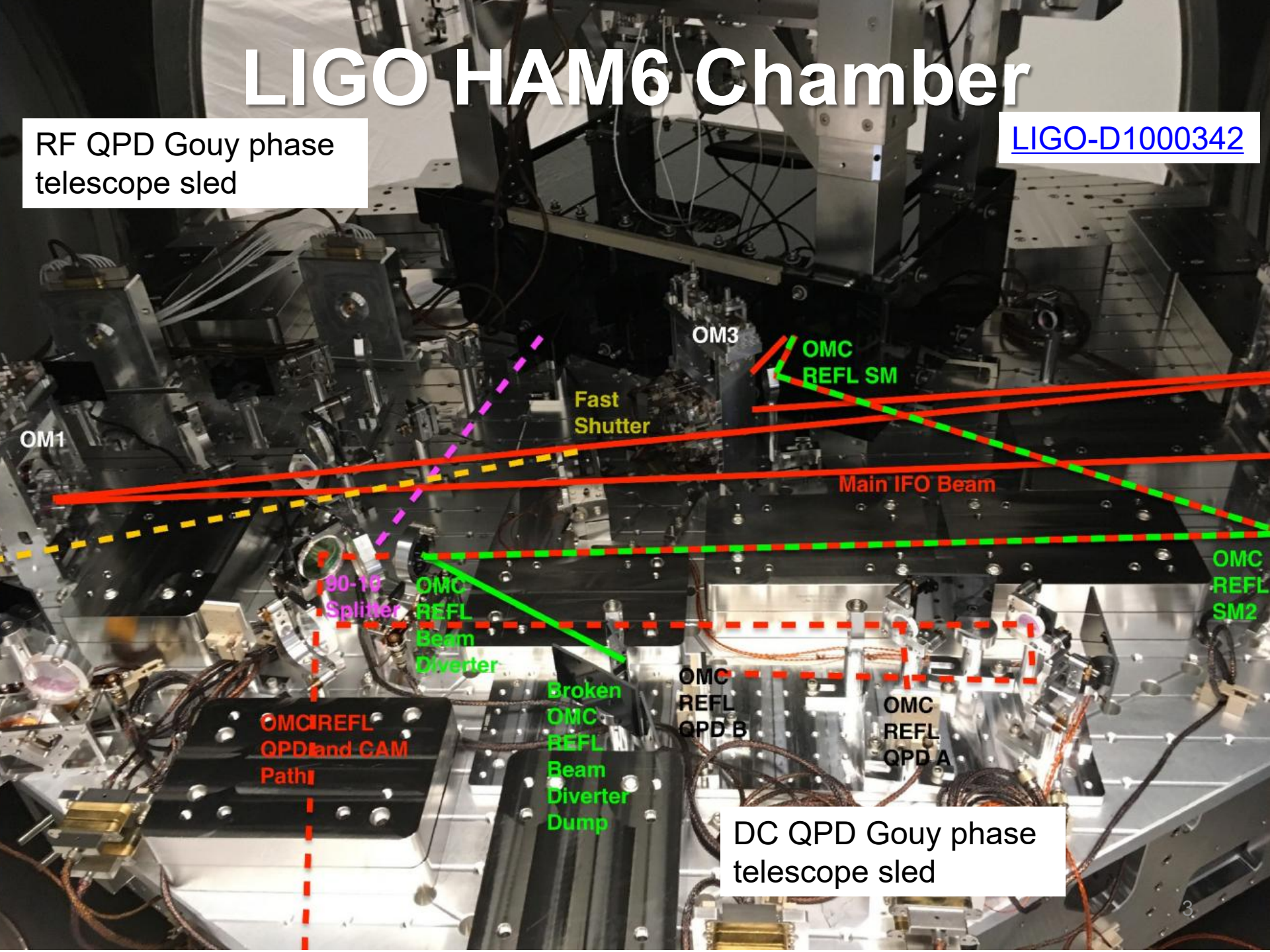
References

- [JGW-G2416134](#) LSC RF PD In-vac Enclosure Review
- [JGW-T2416103](#) In-vac PD/QPD Layout Brainstorming
- [JGW-T1909817](#) AS in-air optical layout
- [JGW-G2315526](#) KFC interface optical layout
- [JGW-D2415729](#) 3D model of optics in OMC chamber (Oct. 18th, 2023) ***MOST UPDATED DRAWING NOW*** (*but not completely true*)
- [LIGO-T1000247](#) LIGO ISC Gouy phase telescope design
- [LIGO-D1002042](#) LIGO ISC QPD Sled Assembly

LIGO HAM6 Chamber

RF QPD Gouy phase
telescope sled

[LIGO-D1000342](#)



OM3

OMC
REFL SM

Fast
Shutter

OM1

Main IFO Beam

90-18
Splitter

OMC
REFL
Beam
Diverter

OMC
REFL
SM2

OMC REFL
QPD and CAM
Path

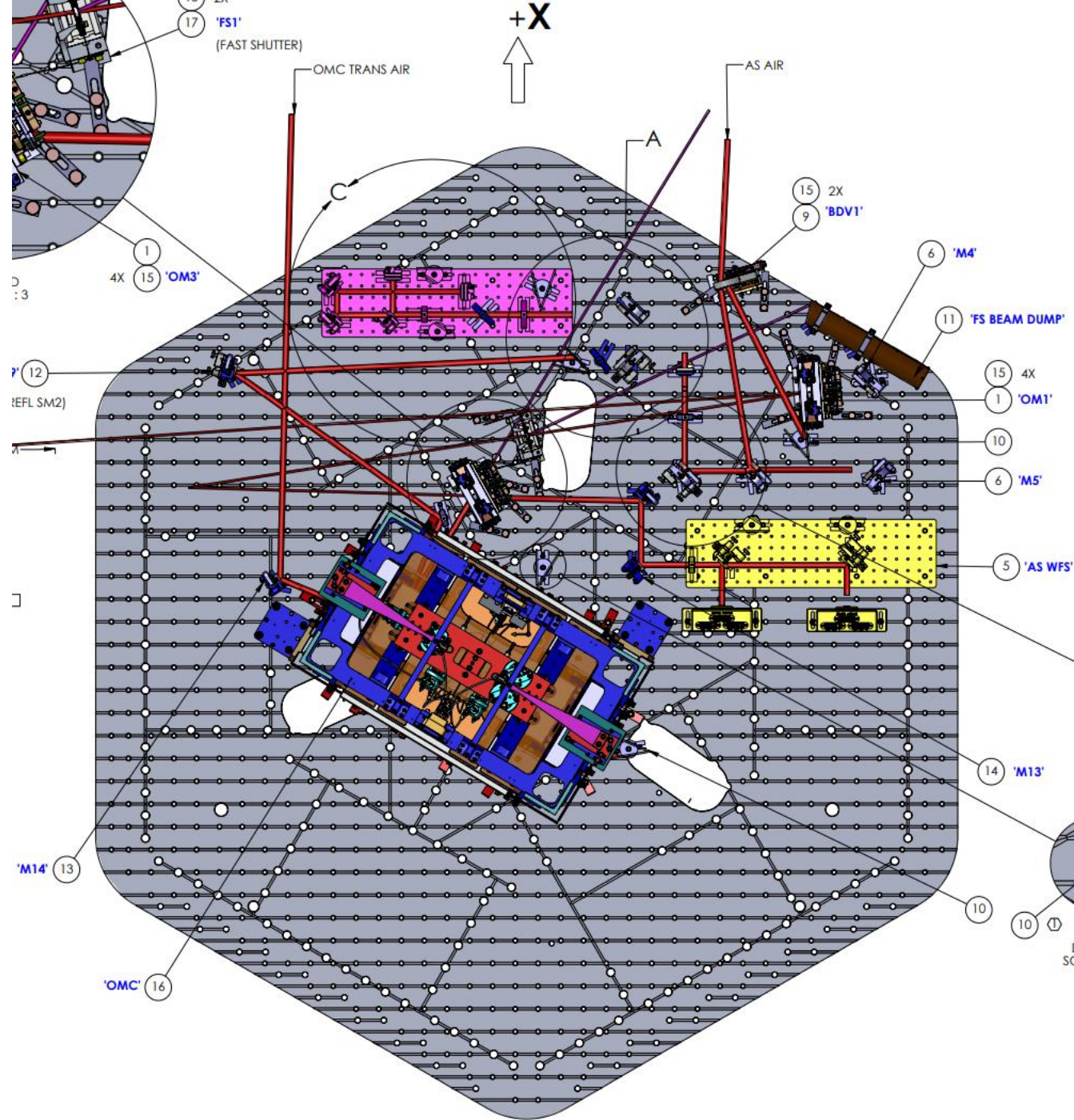
Broken
OMC
REFL
Beam
Diverter
Dump

OMC
REFL
QPD B

OMC
REFL
QPD A

DC QPD Gouy phase
telescope sled

LIGO-D1000342



AS Plan v1: Current layout

[JGW-D2415729](#)

q-parameter at OBS1 (first BS on OMC breadboard)

x: $-0.2125961557874323 + 0.5247396669002964i$

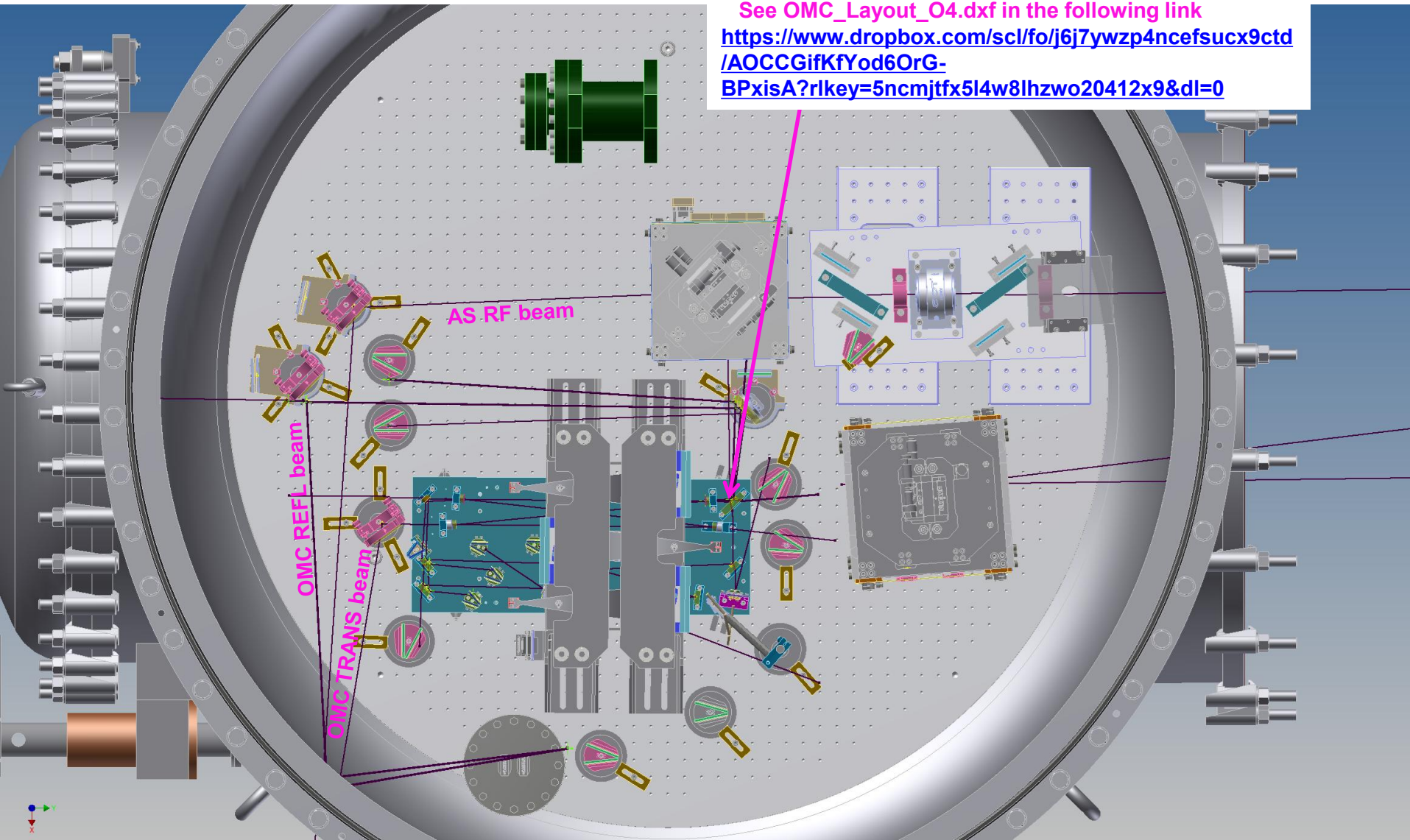
y: $-0.21291352981555933 + 0.5273533359729127i$

See OMC_Layout_O4.dxf in the following link

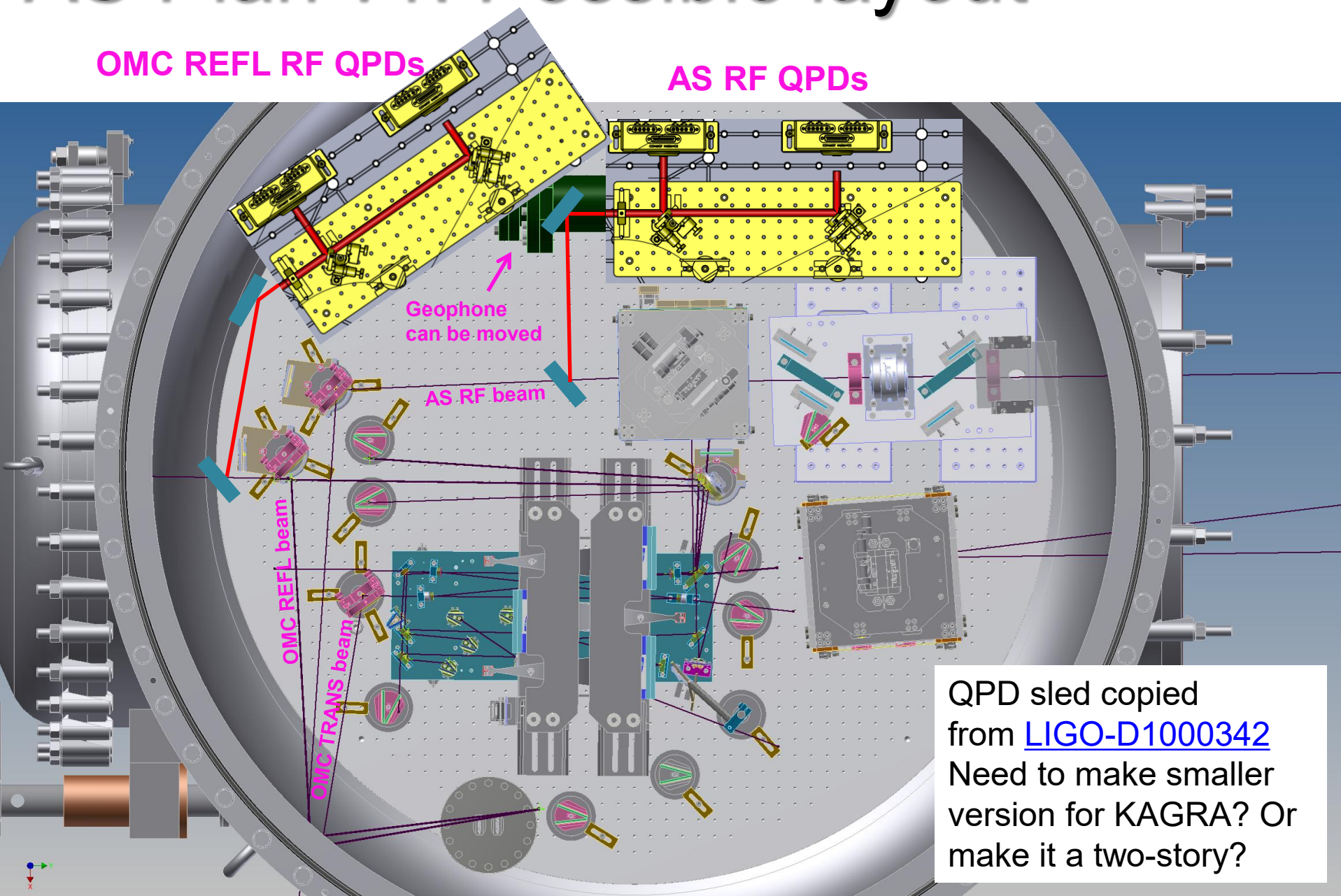
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[/AOCCGifKfYod6OrG-](https://www.dropbox.com/scl/fo/j6j7ywzp4ncefsucx9ctd/AOCCGifKfYod6OrG-BPxisA?rlkey=5ncmjtfx5l4w8lhzwo20412x9&dl=0)

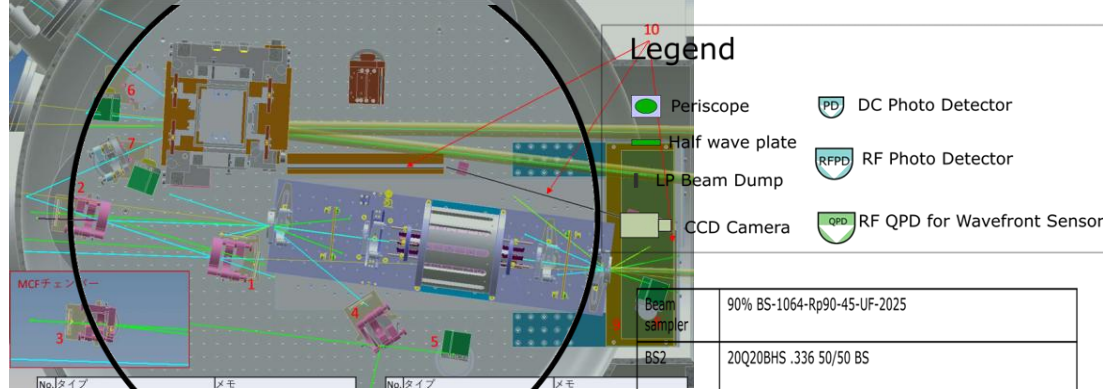
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AS Plan v1: Possible layout



REFL Plan v1



Beam sampler	90% BS-1064-Rp90-45-UF-2025
BS2	20Q20BHS .336 50/50 BS
L3	NBK7 (f = 125 mm)
LNS1	LA1380-C-ML plano-convex f= 500 mm bbaeting 1050-1700 nm
HWP1	CVI-QWPO-1064-10-2
TFP	TFP-SN2-1064
BS1	10Q20HBS .335 50/50 BS
LNS2	EKSMA 110-0545E + AR 1064
HWP2	QWPO 1064-10-2
TFP2	EKSMA TFP

from REFL viewport
to periscope
70 cm

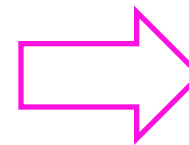
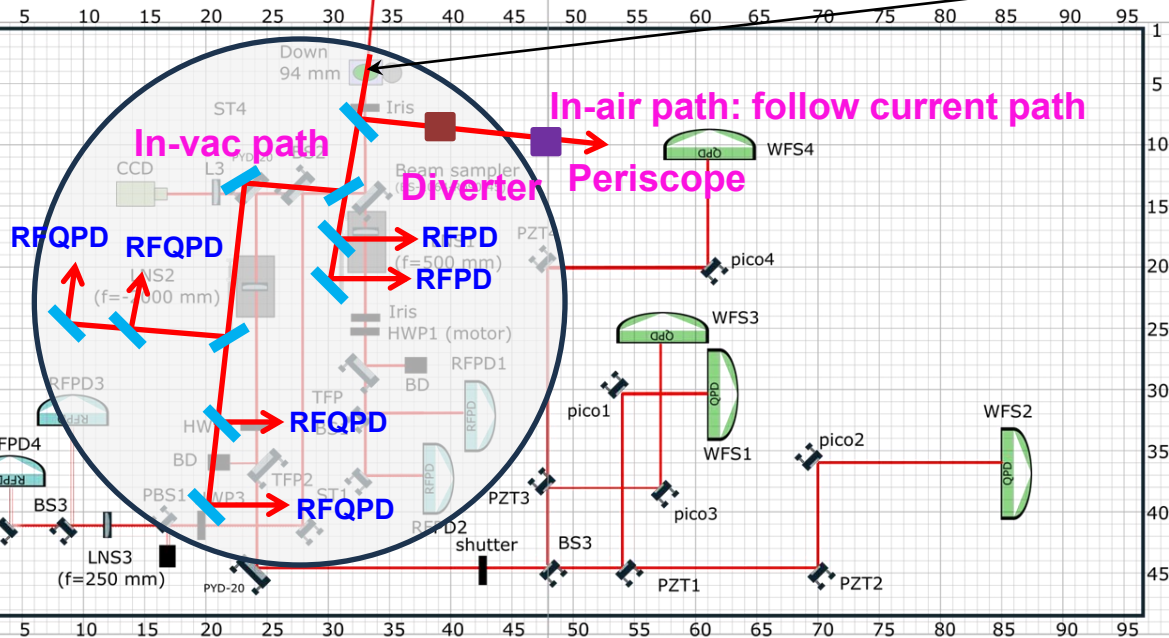
q-parameter at the viewport is
-3.0348m+16.8565i

Distance from the viewport to
the top mirror of this periscope
is 70 cm

Add ~ $\phi 1$ tank
for PD/QPDs
on top of REFL table
Vibration isolation
table in the tank

CL

In-air path: follow current path
In-vac path
Diverter Periscope

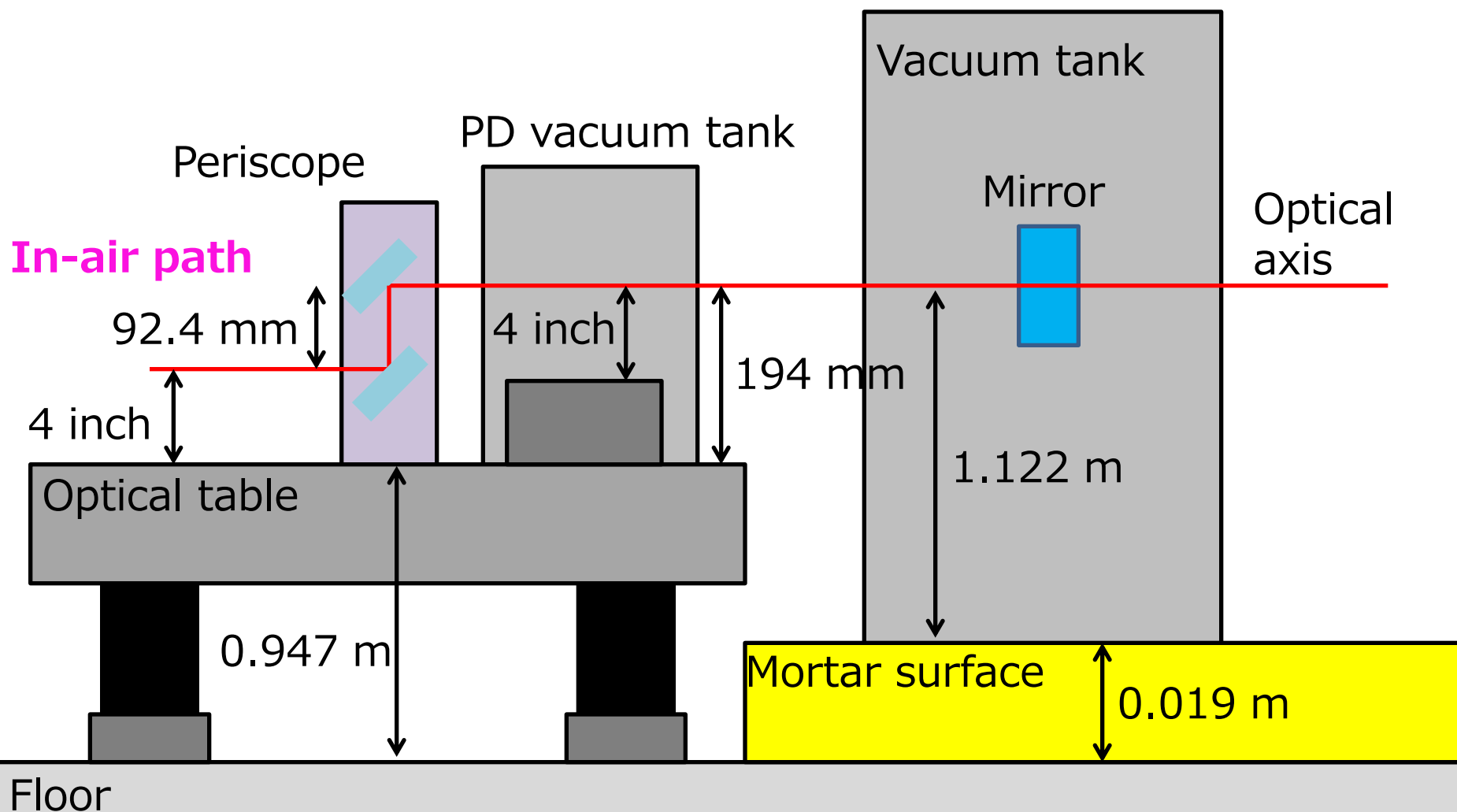


Move table towards +X if
necessary
(Anchor holes for optical leg
clamps would not be there)

JGW-T1809238

REFL Optical Table Height

[JGW-D1402607](#)
[OutputTables wiki](#)



POP Plan

v1

q-parameter at
PR2 AR
 $1.180362 + 0.026317i$
([ModeMatch wiki](#))

Distance between PR2 AR to HBS
= (PR2 to in-vac steering) + (in-vac steering to HBS) + (periscope)
= 278 mm + 1399 mm + 84.4 mm
= 1761.4 mm

Harmonic beam splitter (HBS)

Need to redesign the
optical paths in-air to
squeeze

In-vac green PDs/QPDs are
probably not necessary

[LIGO-D1201457](#)
[LIGO-D1400241](#)

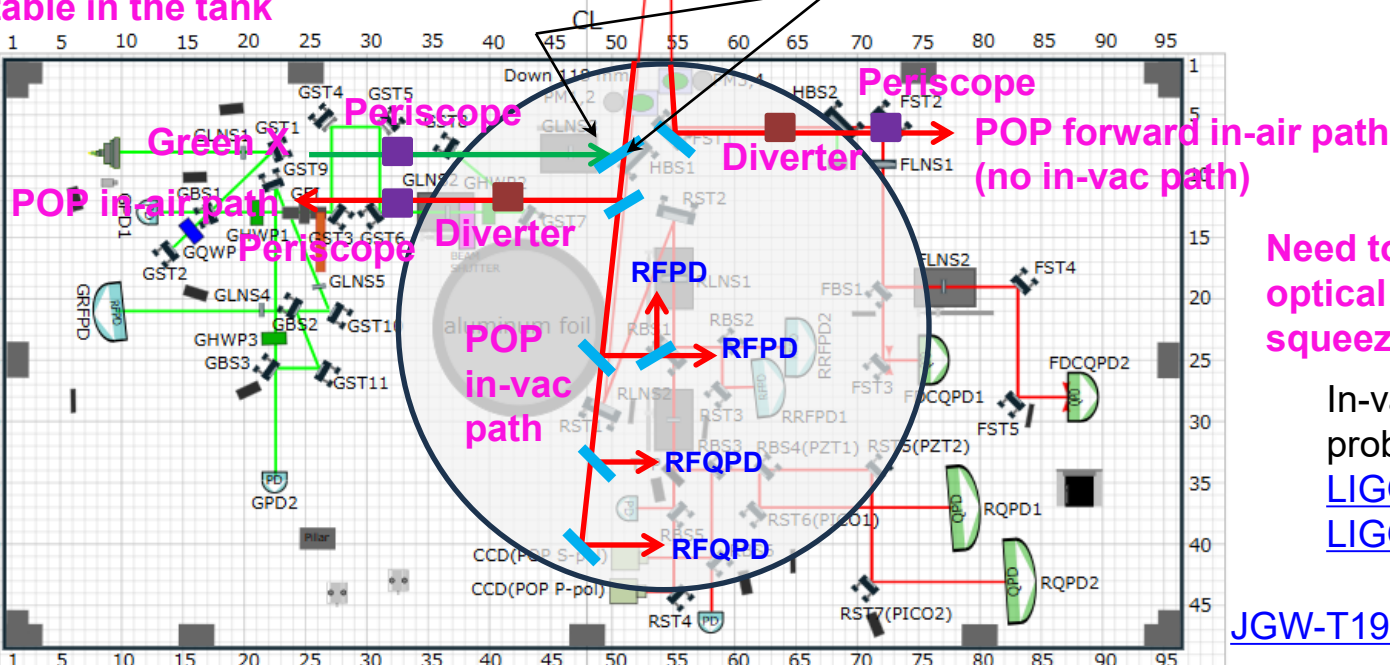
[JGW-T1909623](#)

[JGW-T2113078](#)

Add $\phi 1$ tank
for PD/QPDs
on top of POP table
Vibration isolation
table in the tank

POP
and Green X

POP forward



POP Optical Table Height

[JGW-D1402607](#)
[OutputTables wiki](#)

