

Summary of Current Situation of In-vacuum Steering Mirrors

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In-vac Steering Mirrors

- In-vac steering mirrors summarized in this document
 - Around MCF and IFI (REFL related)
Handled by IOO
 - Around IMMT1 (ISS related)
They are actually partially reflective mirrors ([JGW-G2012232](#))
Handled by SEO and ISS team
 - Around PR2 and SR2 (ALS related)
Handled by MIF/GRE
 - Around OFI and OMC (AS RF, OMC REFL, OMC TRANS related)
Handled by IOO
- Other in-vac steering mirrors not included in this document
 - TMS related
 - Pcal related
 - ...

Around MCF and IFI

- STM1,2 to steer beam to IFI and POM1,2 for REFL beam

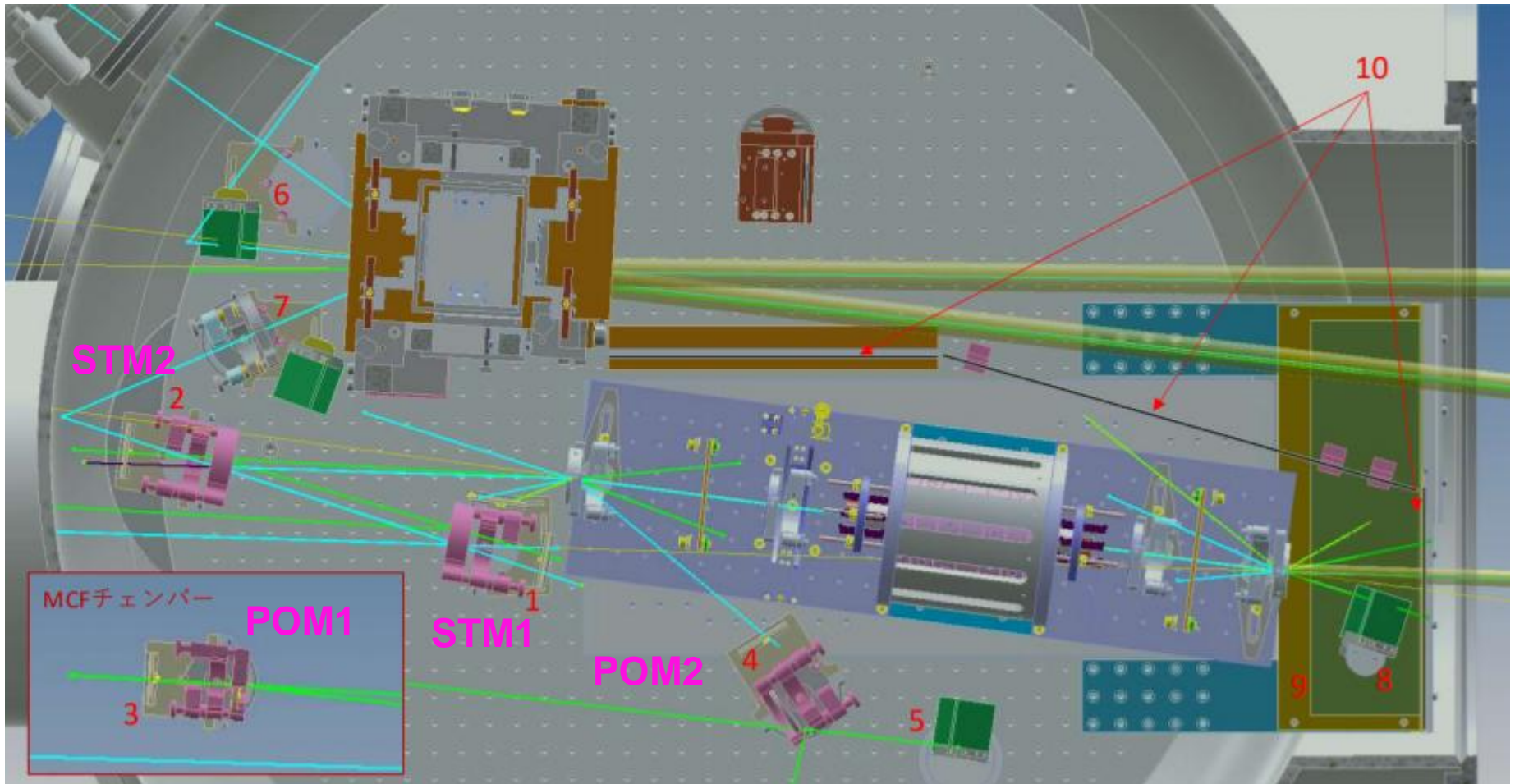


Figure from [JGW-D2112527](#)
See also [JGW-T1706953](#)

Around MCF and IFI

- Autex PYD-20 are used
 lambda/20 polished
 HR>99% for s-pol and p-pol at 0-45 deg
 AR coating ?
- Replaced to Sigma ones
in Oct 2021 [klog #18501](#)

Name	Chamber	Wavelength	Polarization	Incident angle	Currently installed
STM1 (8822-AC-UHV)	IFI	1064 nm	S-pol (to MIF) P-pol (REFL)	8.06 deg 6.63 deg	PYD-20 Sigma
STM2 (8822-AC-UHV)	IFI	1064 nm	S-pol (to MIF) P-pol (REFL)	8.06 deg 6.63 deg	PYD-20 Sigma
POM1 (8822-UHV)	MCF	1064 nm	P-pol (REFL)	1.71 deg	PYD-20
POM2 (U200-A2K)	IFI	1064 nm	P-pol (REFL)	41.7 deg	PYD-20

Nominal beam height around IMC is 209.9mm.

Note that the height of IFI is 10 mm higher (219.9 mm). --> fixed in Oct 2021

Optics height of

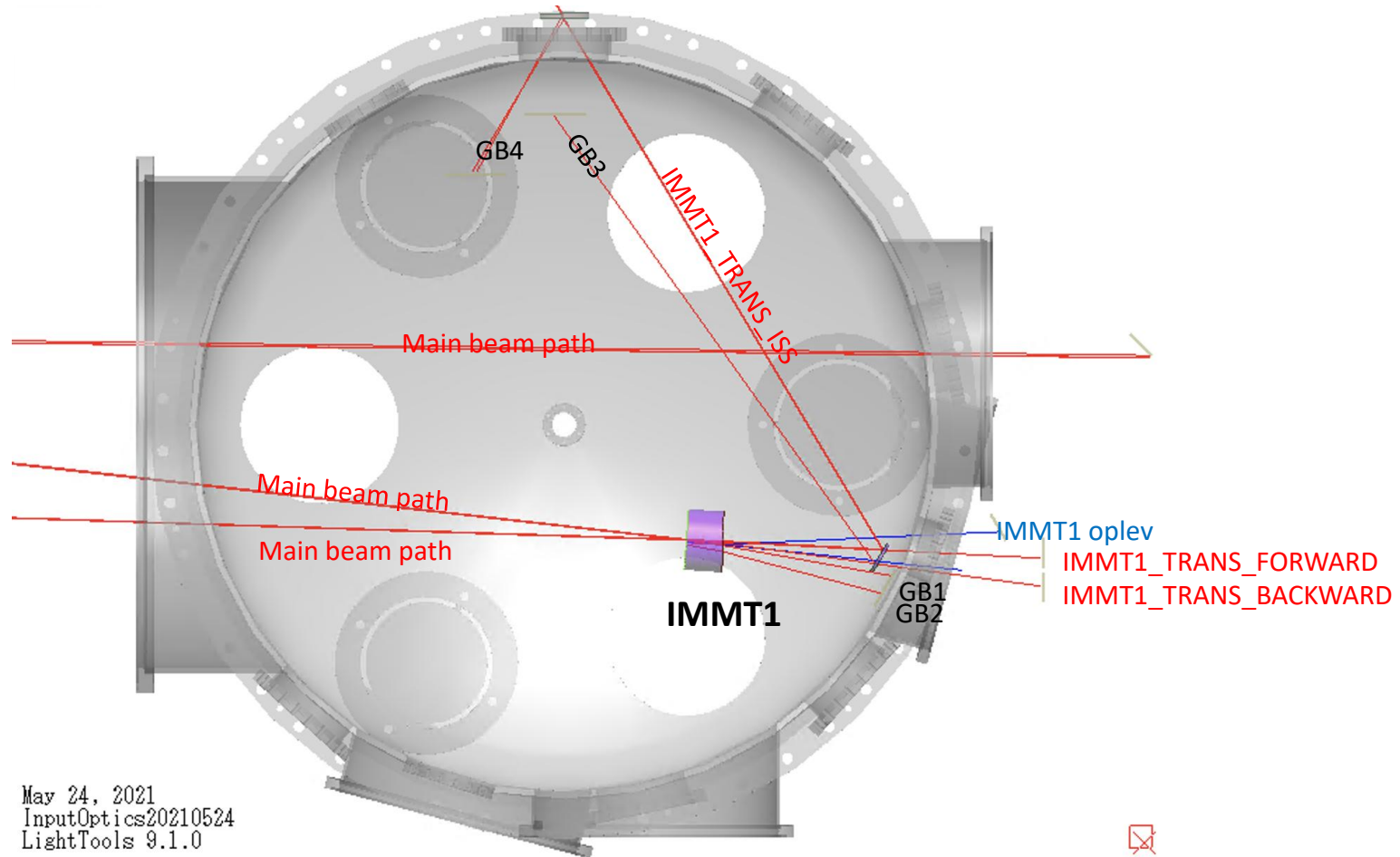
- STM1 and 2 are 210.19 mm ([JGW-D1504212](#))
- POM1 is 209.92 mm ([JGW-D1504162](#))
- POM2 is 209.59 mm ([JGW-D1504213](#))

[klog #18485](#)

From T. Akutsu
[JGW-E2112952](#)

Around IMMT1 (ISS related)

- ISS POM for splitting IMMT1 trans beam to ISS path and IMMT1T QPD path



Around IMMT1 (ISS related)

- Note that ISS POM has to transmit 670 nm oplev beam

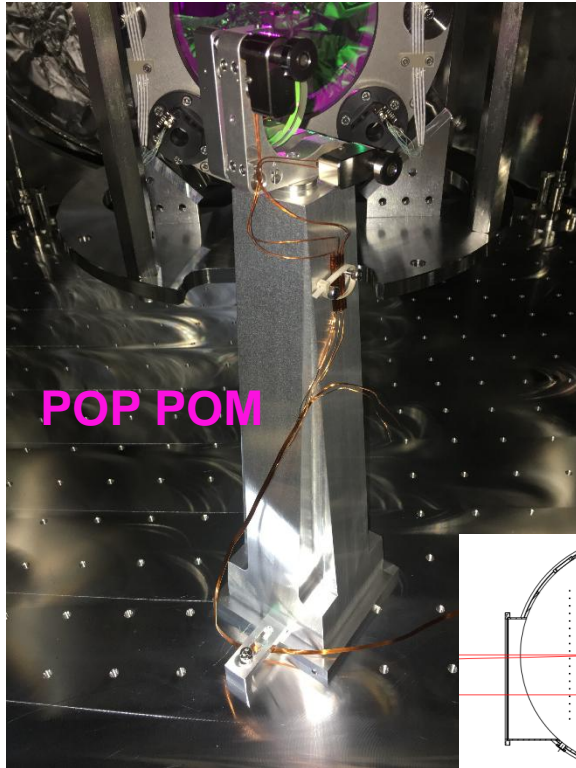
Name	Chamber	Wavelength	Polarization	Reflectivity and Incident angle	Currently installed
ISS POM	IMM	1064 nm 670 nm (oplev, T>90%)	S-pol	90% @ 28 deg	Not yet purchased



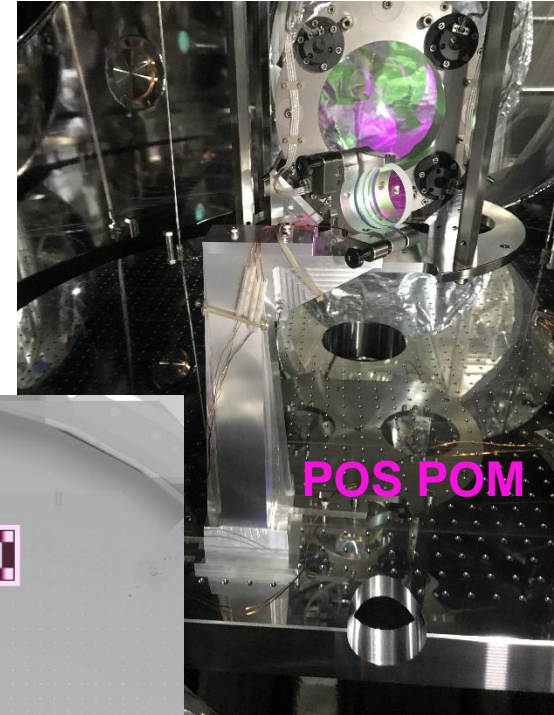
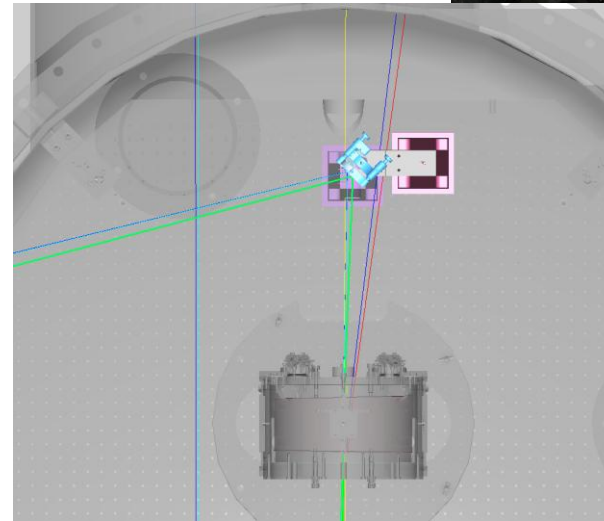
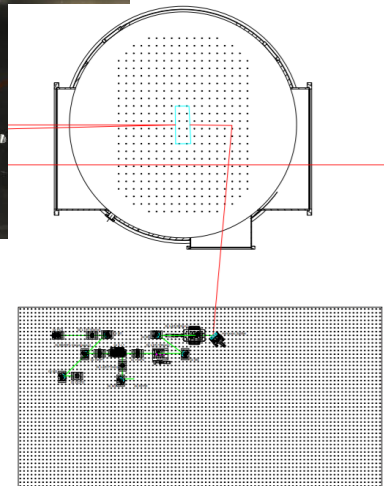
Reflectivity from [JGW-T2112949](#)
Incident angle from T. Akutsu (June 5, 2021)

Around PR2 and SR2 (ALS related)

- Dichroic mirrors at the back of PR2 and SR2 for steering POP and POS beams, injecting green beams



[klog #4364](#)
[JGW-T1910659](#)
[JGW-G1808954](#)
[JGW-T1605261](#)



[klog #7794](#)
[JGW-L1909580](#)
[JGW-T1605967](#)

Around PR2 and SR2 (ALS related)

- Sigma Koki mirrors are used
TFVMQ-50.8C10-20-W1D-532/1064-ARS-30-45D
lambda/20 polished
HR>99% for 1064 nm and 532 nm at 30-45 deg
AR coated (<0.3% for 1064 nm, <2.0% for 532 nm)
specsheet available from [JGW-D1812591](#)

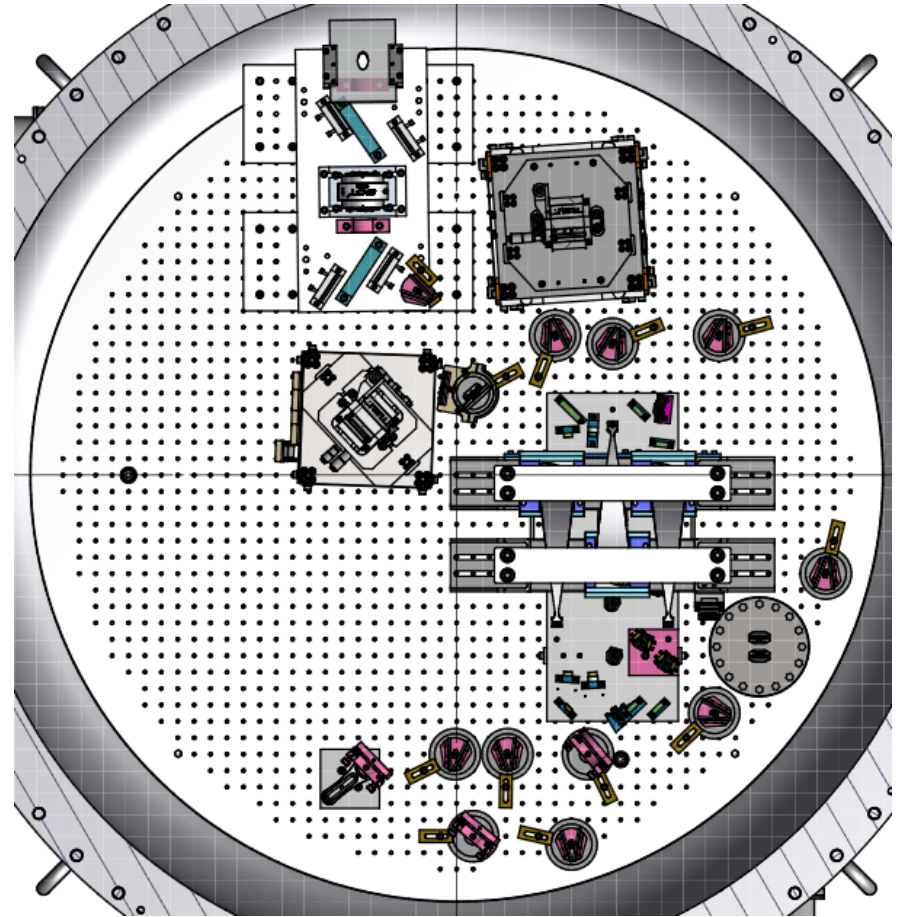
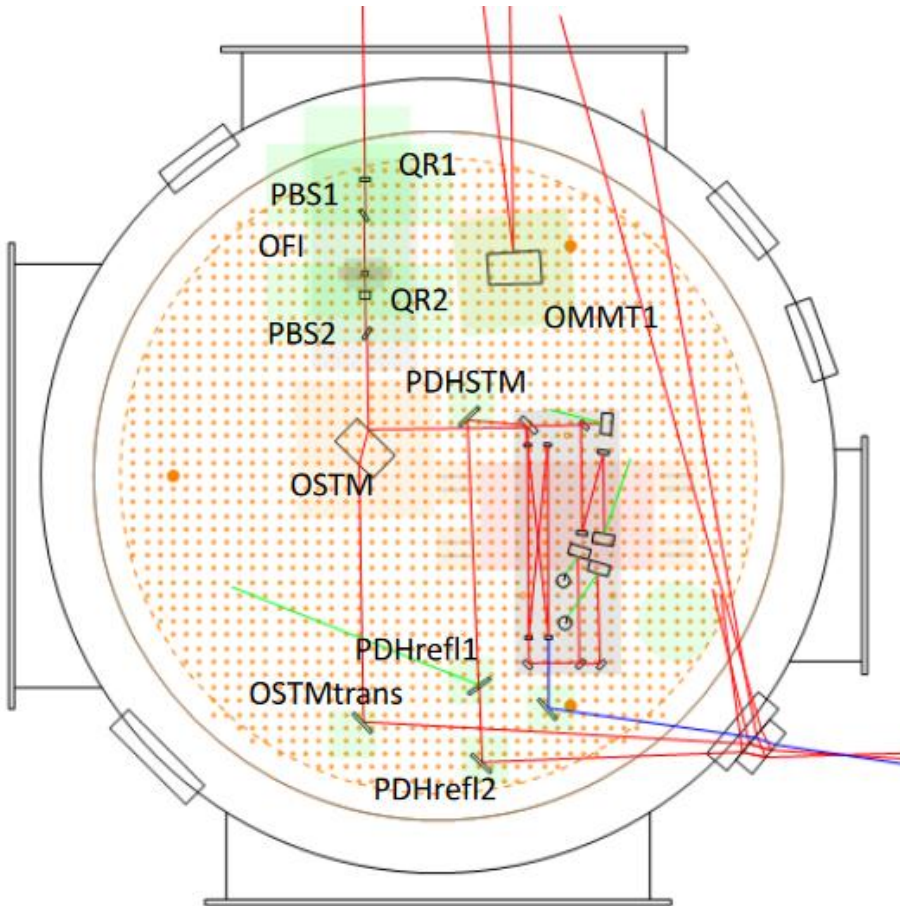
Name	Chamber	Wavelength	Polarization	Incident angle	Currently installed
POP POM	PR2	1064 nm 532 nm	S-pol (POP) S-pol (ALS)	~43 deg ~43 deg	Sigma Koki custom mirror
POS POM	SR2	1064 nm 532 nm	S-pol (POS) S-pol (ALS)	~36.5 deg ~36.5 deg	Sigma Koki custom mirror

From Lighttools
[JGW-L1909580](#)

[JGW-G1808954](#)

Around OFI and OMC

- P-pol after OFI; Steering OTSM trans (AS RF), OMC REFL and OMC TRANS



[JGW-T1808230](#)

Figure from [JGW-D2011398](#)
See also [JGW-T1605967](#)

Around OFI and OMC

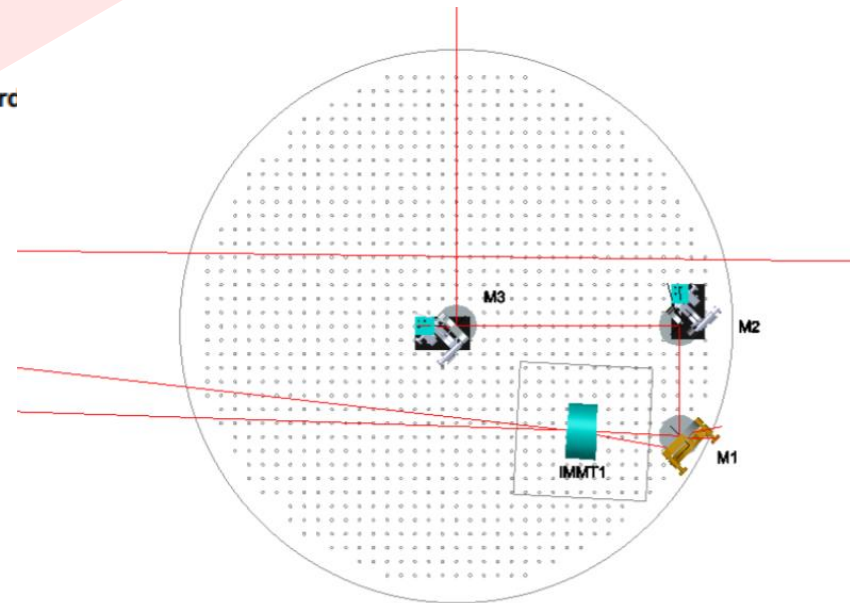
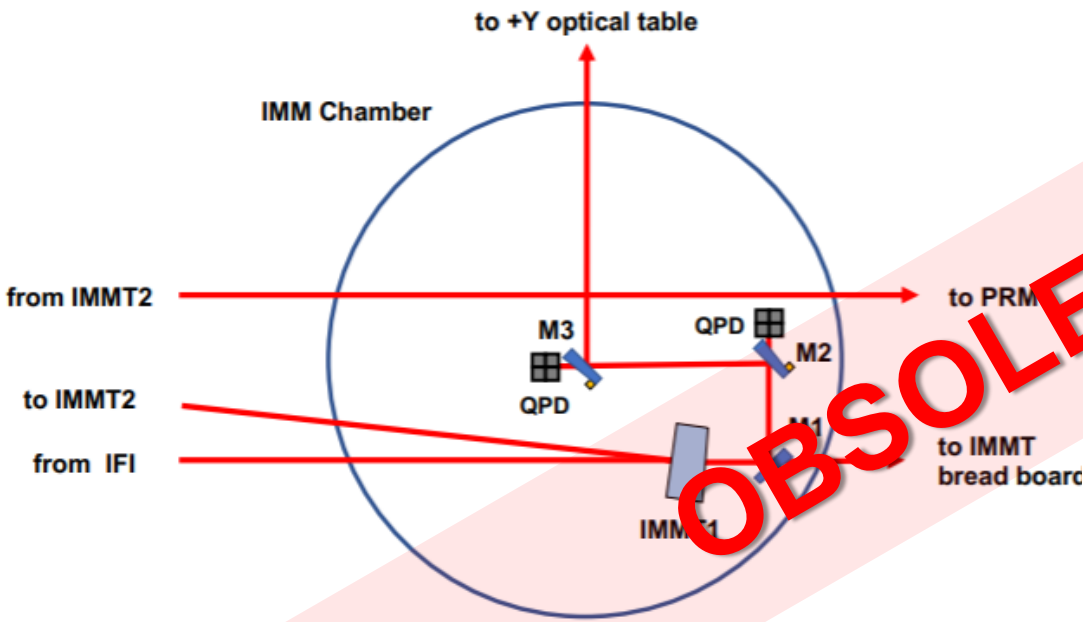
- ~~Autex PYD 20~~ are used
Sigma-Koki TFM-50.8C08-10-1064p-ARS (purchased by Matteo) are used
 - Substrate: OPB-50.8C08-10-5 (BK7, no wedge)
 - HR $R_p > 99.5\%$, AR $R_p < 0.3\%$ at 45 deg

Name	Chamber	Wavelength	Polarization	Incident angle	Currently installed
For OSTM TRANS	OMC	1064 nm	P-pol	???	Sigma-Koki mirror
For OMC REFL 1	OMC	1064 nm	P-pol	???	Sigma-Koki mirror
For OMC REFL 2	OMC	1064 nm	P-pol	???	Sigma-Koki mirror
For OMC TRANS	OMC	1064 nm	P-pol	???	Sigma-Koki mirror

OBSOLETE INFO

Around IMMT1 (ISS related)

- M1, M2 and M3 for steering IMMT1 trans



Figures from [JGW-G2012232](https://www.nasa.gov/licenses/public_domain)

Around IMMT1 (ISS related)

- To be determined by SEO and ISS team
- Note that M1 has to transmit 670 nm oplev beam

Name	Chamber	Wavelength	Polarization	Reflectivity and Incident angle	Currently installed
M1	IMM	1064 nm 670 nm (oplev, T>90%)	S-pol	99.5% @ 45 deg	Not yet purchased
M2	IMM	1064 nm	S-pol	99.5% @ 45 deg	Not yet purchased
M3	IMM	1064 nm	S-pol	99.5% @ 45 deg	Not yet purchased

From Y. Moriwaki