

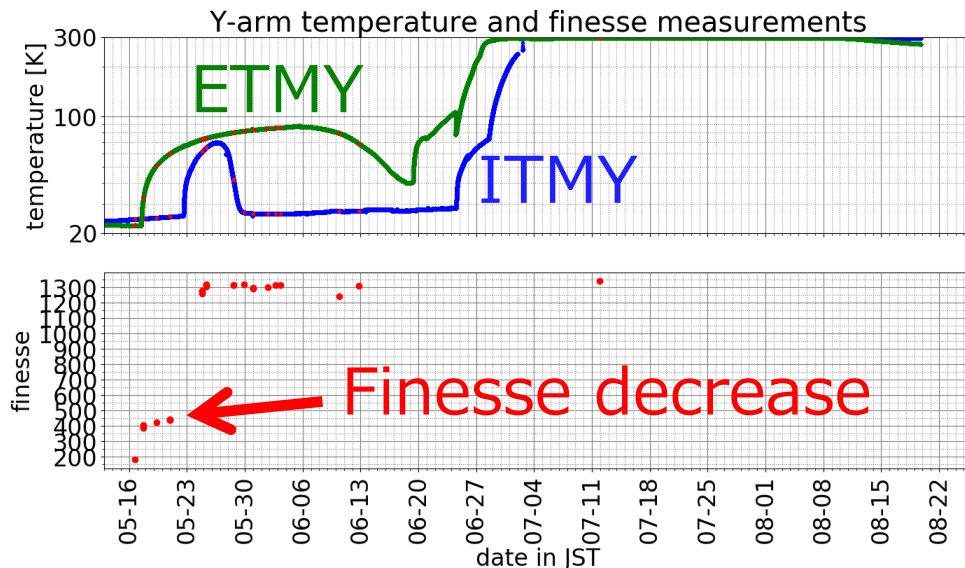
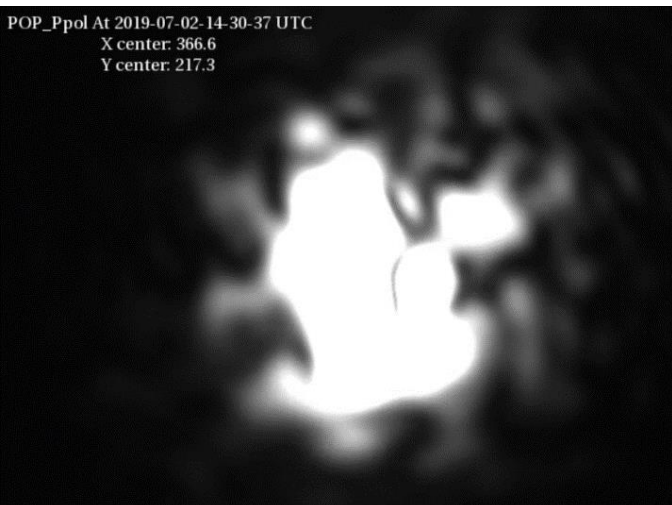
Summary of Sensitivity Estimate for O3 in Various Interferometer Configurations

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Background

- Inhomogeneous birefringence of ITM sapphire mirrors has been found to be larger than the requirement (see [JGW-G1910369](#) and related documents)
- Frosting issue of sapphire mirrors has been found and the finesse of the arm cavities drops at cryogenic temperatures (see [klog #9827](#) for the summary)

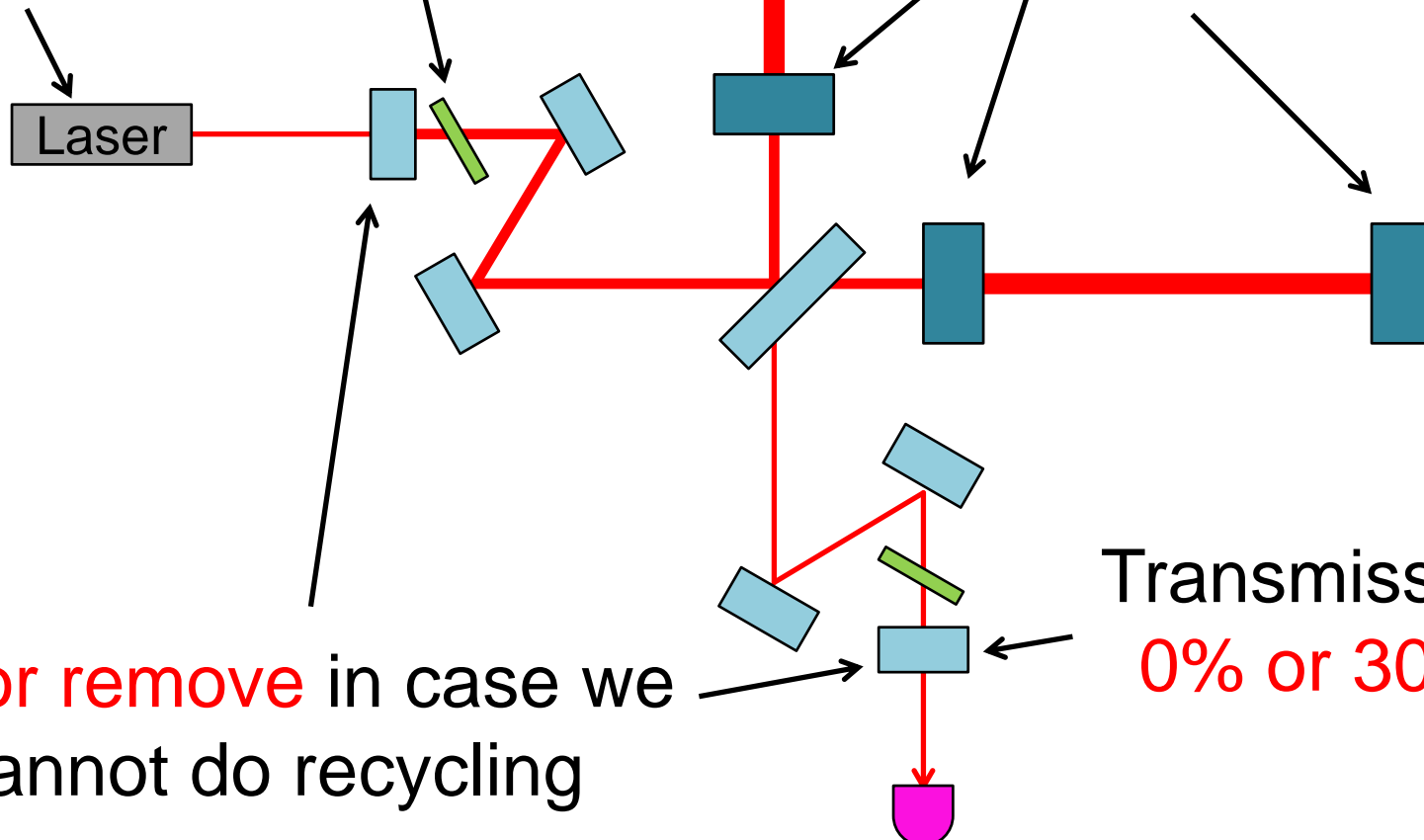


Options

Put polarizers to remove unwanted polarization?

~10 W at max

Room temperature or cryogenic temperatures



Tilt or remove in case we cannot do recycling

Transmission
0% or 30%

“Ultimate” BNS Range

- Actual sensitivity will likely be worse (see [JGW-G1910828](#) for details; calculation based on [JGW-T1808172](#))

SRM	30 %	0 %	30 %	0 %
PRM	10 %	10 %	removed	removed
DRFPMI	30 Mpc 100 W at BS	-	-	-
PRFPMI	(10 Mpc) 100 W at BS SRM tilted	19 Mpc 100 W at BS	-	-
SRFPMI	10 Mpc 1 W at BS PRM tilted	-	17 Mpc 10 W at BS	-
FPMI	(4 Mpc) 1 W at BS PRM/SRM tilted	7 Mpc 1 W at BS PRM tilted	(7 Mpc) 10 W at BS SRM tilted	12 Mpc 10 W at BS 4

“Ultimate” BNS Range with 300 K

- Actual sensitivity will likely be worse (see [JGW-G1910828](#) for details; calculation based on [JGW-T1808172](#))

SRM	30 %	0 %	30 %	0 %
PRM	10 %	10 %	removed	removed
DRFPMI	12 Mpc 100 W at BS	-		
PRFPMI	(4 Mpc) 100 W at BS SRM tilted	7 Mpc 100 W at BS		
SRFPMI	~4 Mpc? 1 W at BS PRM tilted	-	~7 Mpc? 10 W at BS	-
FPMI	(2 Mpc) 1 W at BS PRM/SRM tilted	3 Mpc 1 W at BS PRM tilted	(3 Mpc) 10 W at BS SRM tilted	5 Mpc 10 W at BS

Decisions So Far

- Proposal to put polarizers inside the recycling cavities or to remove PRM/SRM was **rejected** by EO (Sept 20)
- Locking dual recycling turned out to be harder than expected, and decided to **focus on FPMI** (Sept 30; [JGW-G1910858](#))
- Commissioning of FPMI mostly done at room temperature (at **~ 250 K**)
- If we start the run in this month, the configuration will most likely to be
*FPMI with tilted PRM and SRM, at ~250 K
(~ 2 Mpc at maximum)*

Sensitivity

