

# Summary of Sensitivity Estimate for O3 in Various Interferometer Configurations

Yuta Michimura

# Disclaimer

- Assuming x8 O1 excess noise
- Assuming 10 W at PRM  
(1W at BS in case PRM is tilted)
- Inhomogeneity and birefringence not fully included
- Less PRC gain due to birefringence etc. are not included but less PRC gain can be in principle compensated by increasing the input power
- BNS range is simply multiplied by  $\sqrt{0.3}$  when SRM is tilted

# “Ultimate” BNS Range

- Actual sensitivity will likely be worse
- 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 <sup>3</sup>

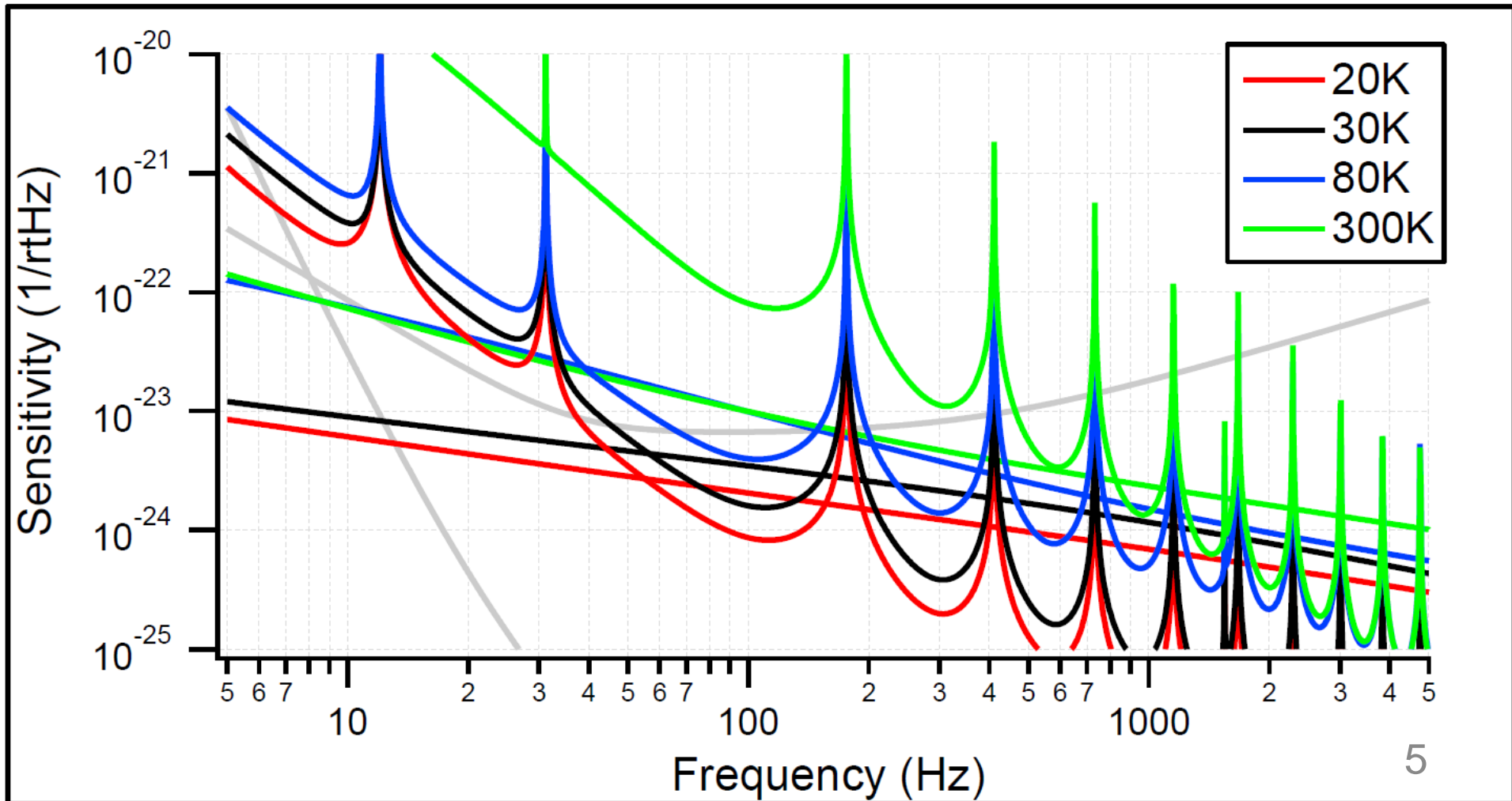
# Concerns

- DRFPMI
  - Might require polarizers in PRC and SRC for stable lock
- PRFPMI
  - Might require polarizers in PRC for stable lock
  - LSC and ASC might be tougher than DRFPMI due to less  $f_1$  at AS port
- SRFPMI
  - Might require polarizers in SRC for stable lock
  - Frequency/Intensity noise coupling will be x10 higher
- FPMI
  - Frequency/intensity noise coupling will be x10 higher

# Other Temperatures

- Suspension thermal noise below 80 K is below x8 O1 excess noise

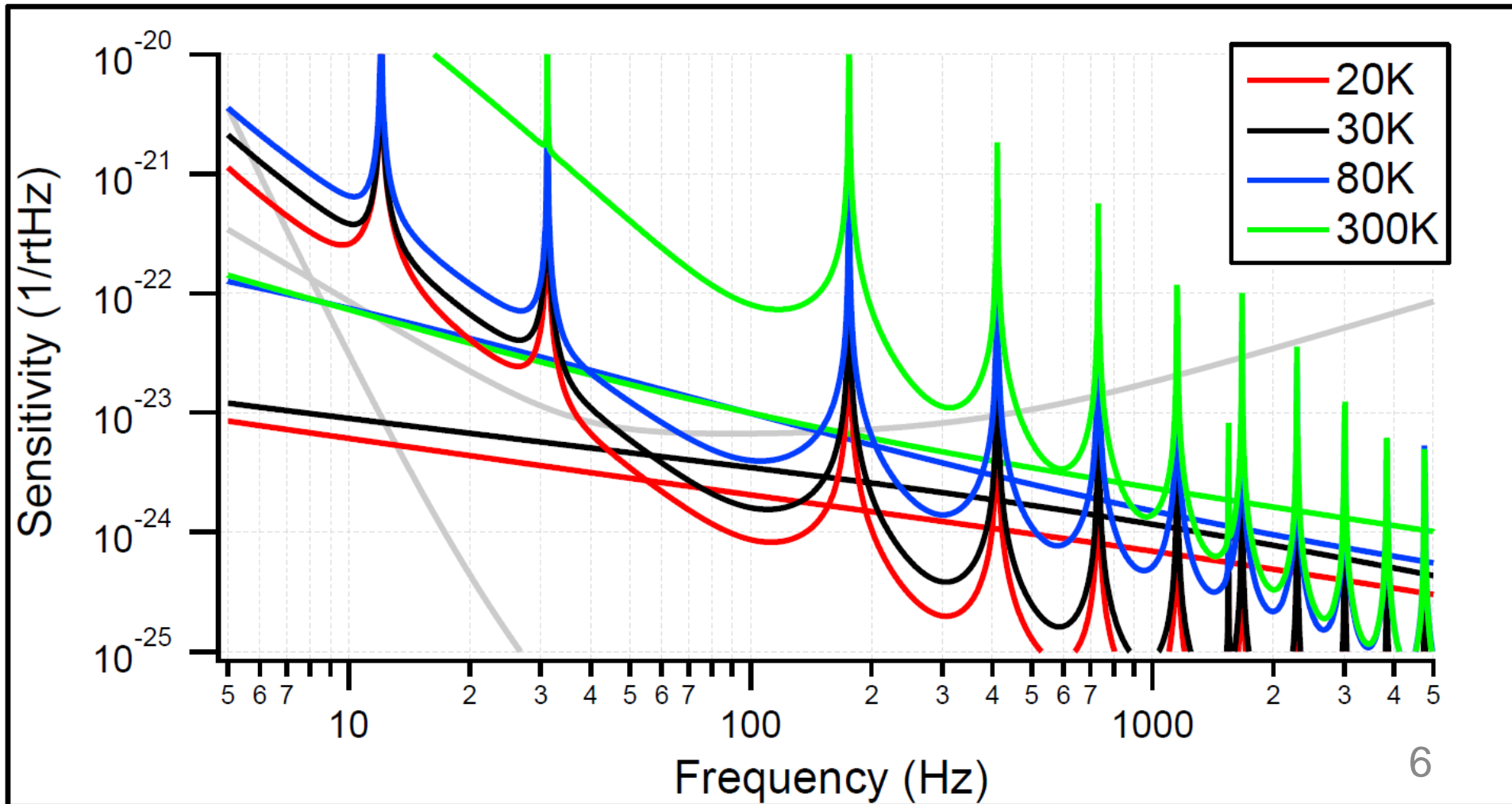
Calculated by K. Somiya



# Other Temperatures

- Suspension thermal noise at 300 K is roughly x160 O1 excess noise

Calculated by K. Somiya



# “Ultimate” BNS Range with 300 K

- See p.7 in [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