Thermal noise limit

Parameters needed for thermal noise calculation

Literature:

- [1] J. Opt. Soc. Am. B pp 914, Vol. 27, No. 5/May 2010
- [2] NATURE PHOTONICS Vol.7, 644 (2013)
- [3] Optics Letters, Vol. 40, Iss. 9, p. 2112 (2015).

Description	Material	Parameter name	Value	Comment
Boltzmann constant		kb	1.38064852 × 10-23 m2 kg s-2 K-1	
Temperature (K)		T	300	
Poisson Ratio of substrate	Fused Silica	σ_{sb}	0.16	Fused Silica substrtae [1]
Poisson Ratio of coating	AlGaAs	σ_{c}	0.32	AlGaAs coating [2]
Young's modulus of substrate	Fused Silica	E_{sb}	72.7 Gpa	Fused Silica substrtae [1]
Young's modulus of spacer	ULE	E_{sp}	67.6 Gpa	ULE Spacer [1]
Young's modulus of coating	AlGaAs	E_{c}	100 Gpa	AlGaAs coating [2]
Length of cavity		L	0.48 m	Sr Beast [3]
Spacer radius		R_{sp}	0.045 m	Sr Beast [3]
Central bore radius of spacer		r_{sp}	0.0065 m	Sebastian Häfner Thesis page 83
Thickness of coating	AlGaAs	D	$6.83*10^{-6}$ m	AlGaAs coating [2]
$1/e^2$ mode radius on the mirror		w	0.000488 m for Mirror 1 0.000677 m for Mirror 2	Mode calculations
Effective coefficient of thermal expansion for substrate		α_{sb}	1.2* 10-6 K-1	Fused Silica substrtae [2]
Effective coefficient of thermal expansion for coating		α_{c}	1.68* 10-5 K-1	AlGaAs coating [2]
Effective thermorefractive coefficient for coating		β_{c}	5*10-5	AlGaAs coating [2]
Thermal conductivity for substrate		κ_{sb}	1.38 W/Km	Fused Silica substrate [2]
Thermal conductivity for coating		κ_{c}	62.9 W/Km	AlGaAs coating [2]
Heat capacity per unit volume for substrate		C_{sb}	1.71*106 J/Km3	Fused Silica substrate [2]
Heat capacity per unit volume for coating		C_{c}	1.64*106 J/Km3	AlGaAs coating [2]