Thermal noise limit

Parameters needed for thermal noise calculation

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]

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