T1300475 OFI Scatter
5/13/13

input laser power, W	$P_{psl} := 125$	
transmissivity of SRM HR	$T_{srmhr} := 0.2$	
reflectivity of SRM AR	$R_{srmar} := 50 \cdot 10^{-6}$	
transmissivity of SRM AR	$T_{srmar} := 1 - R_{srmar}$	$T_{srmar} = 1$
reflectivity of SRM HR	$R_{srmhr} := 1 - T_{srmhr}$	$R_{srmhr} = 0.8$
arm cavity gain	$G_{ac} := 13000$	
arm cavity power, W	$P_a := \frac{P_{psl}}{2} \cdot G_{ac}$	$P_a = 8.125 \times 10^5$
Transmissivity of ITM HR	$T_{itmhr} := 0.014$	
power in power recycling cavity both arms, W	$P_{rc} := \frac{2P_a \cdot T_{itmhr}}{4}$	$P_{rc} = 5.688 \times 10^3$
as port signal ratio	$G_{as} := 0.00108$	
output signal power, W	$P_{srm} := P_{psl} \cdot G_{as}$	$P_{srm} = 0.135$
power in signal recycling cavity, W	$P_{src} := \frac{P_{srm}}{T_{srmhr}}$	$P_{src} = 0.675$
Motion of baffle @ 100 Hz, m/rt Hz	$x_{hamsei} := 1 \cdot 10^{-12}$	
transmissibility of OFI SUS along beam axis@ 100 Hz	$A_{ofibeam} := 0.01$	

laser wavelength, m $\lambda := 1.064 \cdot 10^{-6}$

wave number, m^-1 $k := 2 \cdot \frac{\pi}{\lambda}$ $k = 5.905 \times 10^{6}$

IFO waist size, m $w_{ifo} := 0.0120$

solid angle of IFO mode, sr $\Delta_{ifo} := \pi \cdot \left(\frac{\lambda}{\pi \cdot w_{ifo}} \right)^2$ $\Delta_{ifo} = 2.502 \times 10^{-9}$

SRM AR beam radius, m $w_{srmar} := 0.002049$

Transfer function @ 100 Hz, SRM $TF_{srm} := 4.22 \cdot 10^{-10}$

power incident on Faraday Isolator, W $P_{FIin} := P_{srm}$

number of OFI optical surfaces
before Faraday rotator Magnet $N_s := 7$

BRDF pf OFI optical surfaces, sr^-1 $BRDF_{farad} := 5 \cdot 10^{-4}$

light scattered from OFI surfaces
before Faraday rotator Magnet $P_{farads} := N_s \cdot P_{FIin} \cdot BRDF_{farad} \cdot \frac{w_{ifo}^2}{w_{srmar}^2} \cdot \Delta_{ifo}$

Scattered Light Displacement Noise $DN_{faradsifo} := TF_{srm} \cdot \left(\frac{P_{farads}}{P_{psl}} \right)^{0.5} \cdot x_{hamsei} \cdot 2 \cdot k \cdot A_{ofibeam}$

$DN_{faradsifo} = 2.839 \times 10^{-23}$