First estimation according Stefano and Irene (Scattered light noise ... paper Nov 1997)

h(f) = hc · kc· x(f)   spectral signal of noise in Virgo

x(f) is the seismic displacement

kc= 4 * π / λ

$$hc := \frac{\lambda^2 \cdot \varepsilon}{2^{\frac{5}{2}} \cdot \pi^2 \cdot Lt \cdot Rm} \cdot \sqrt{\rho mod} \qquad \sim 2\ 10^{-25}$$

The factor ρmod has to be re-evaluated with the AdV parameters

$$\rho mod := 0.423\,\pi \cdot k^2 \cdot Bo \cdot \frac{Rm^2}{Rt^2}$$

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

$k := 0.1$? Losses coefficient, dimensionless

$Rm := 0.175\,m$? mirror radius (coating)

$Rt := 0.5\cdot m$ trap cryo surface inner radius

$Lt := 3000\,m$ tube lenght

$Bo := 1.47\,10^{-4}$? surface properties (stainless steel), aluminum or Ice better ?

$\varepsilon := 10^{-5}$? scattering losses

0.423 is the view integral, for teta1, teta2 $\approx$ 0.15, 0.12

We can start considering the ground seism measured in Virgo in particularly bad weather conditions, that often limits the present Virgo, inducing 'upconversion' effects. See the following data by Irene: the rms of virgo soil displacement can be greater than lambda in case of sea activity medium to very large (we measured up to 15microns at 0.3 Hz)