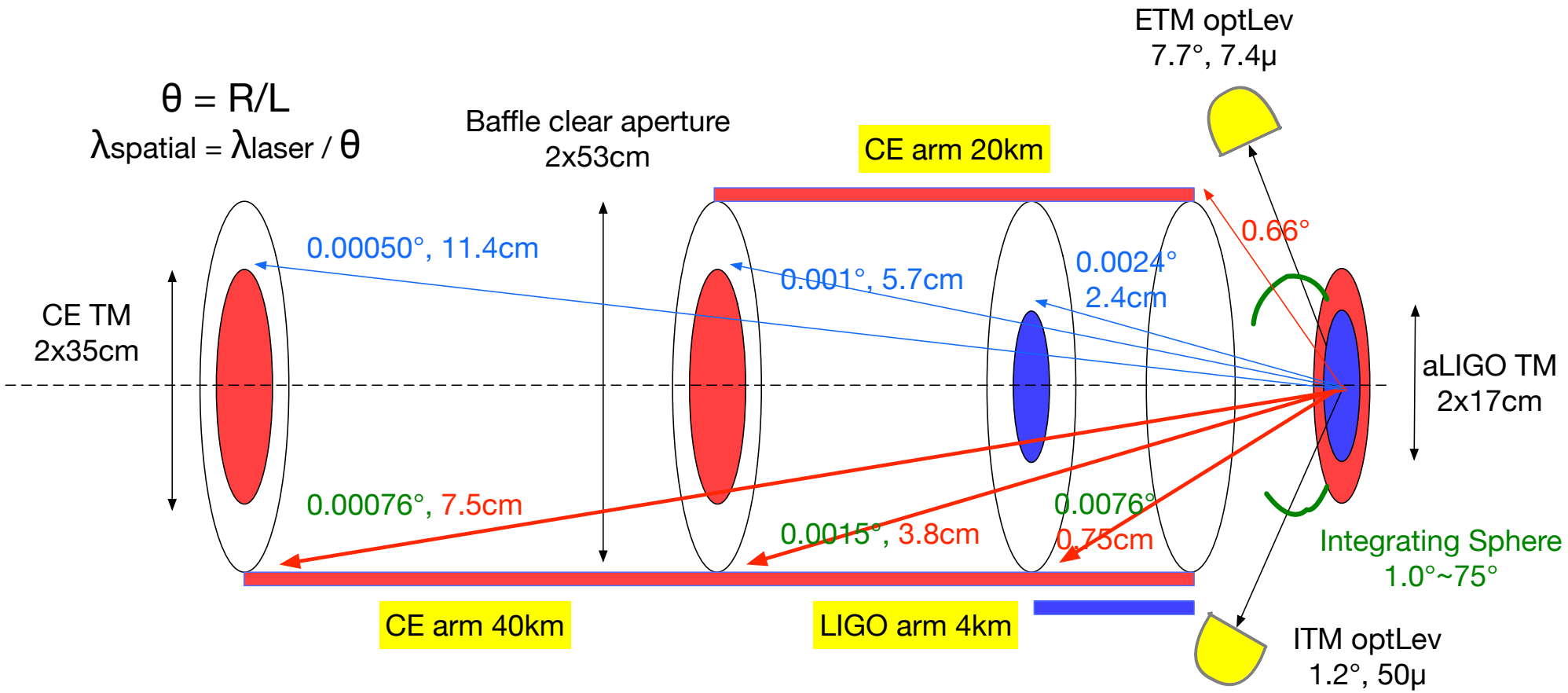
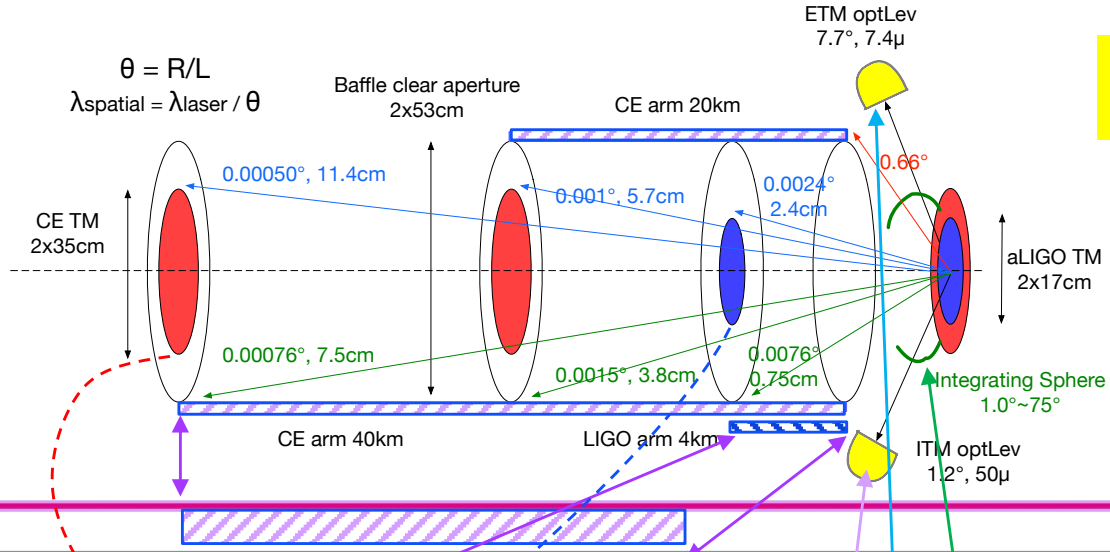
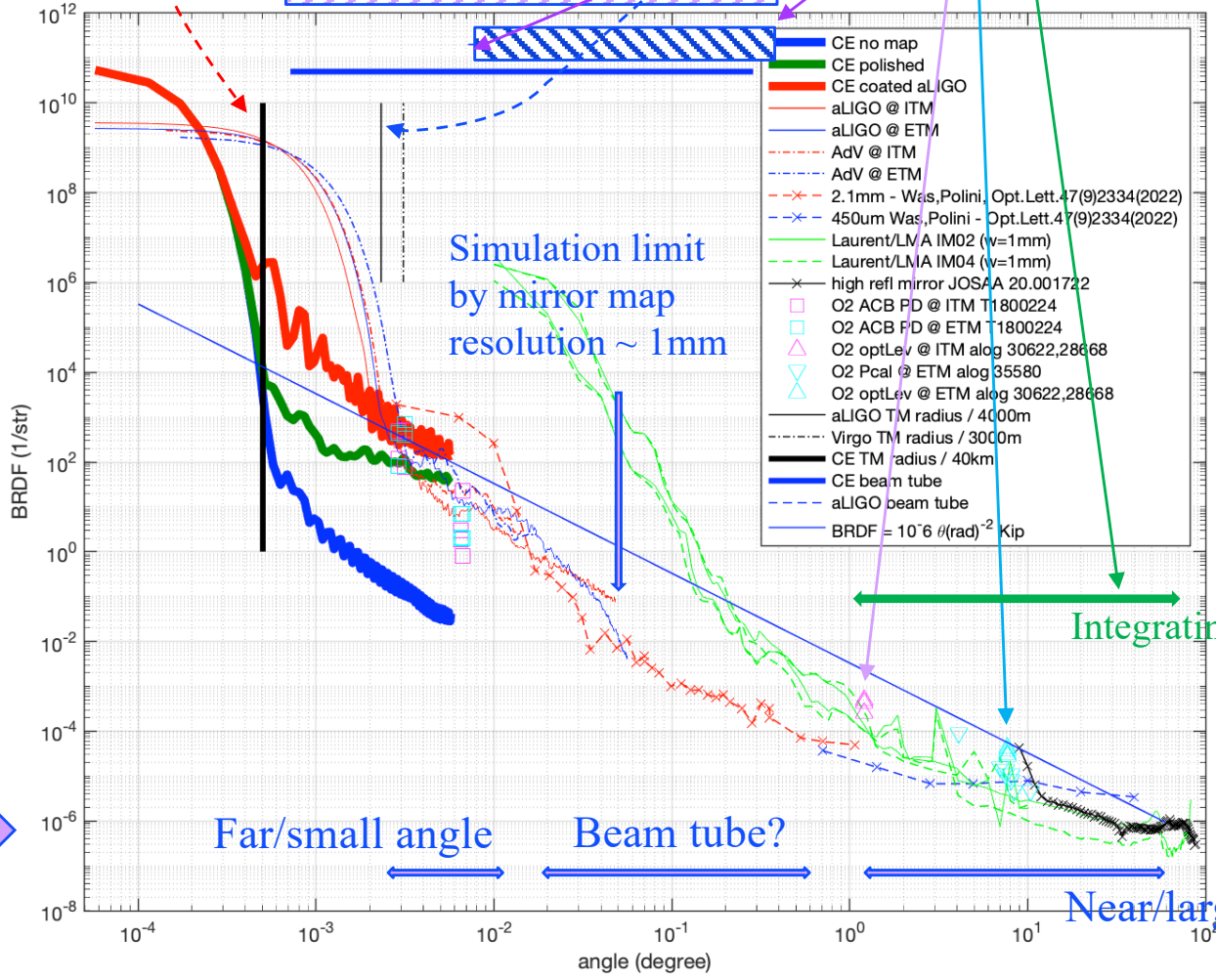
Geometries of LIGO and CE arms

$\theta = \lambda_{space} / \lambda_{laser}$



$\theta = \lambda_{space}/\lambda_{laser}$





aLIGO ⇒

Far/small angle

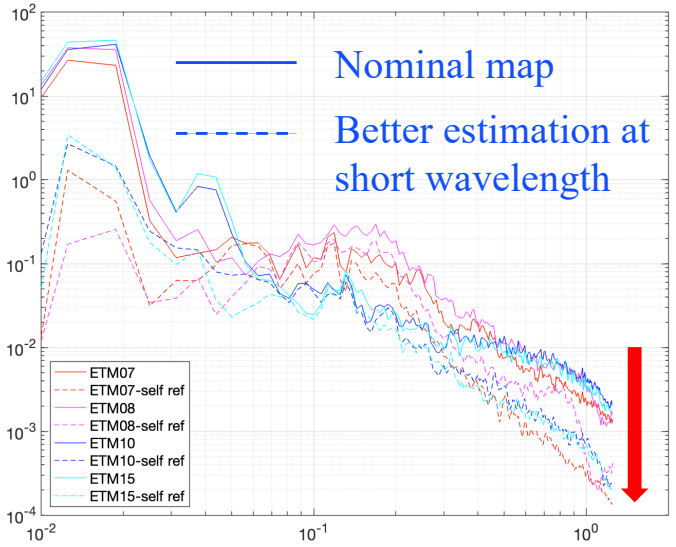
Beam tube?

Near/large angle

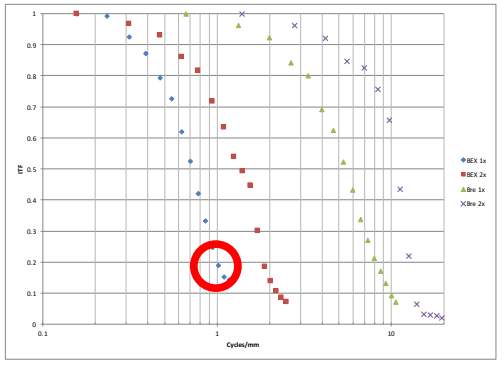
What we don't know (1) aLIGO

- To explain the PRG of 50, extra 25ppm is needed in addition to know losses by surface map and scattering losses. (O4 mirrors needs 10ppm more)
  - » Small angle (near mirror edge), medium (scattering to beam tube) and large angle (out of beam tube) scattering contribute quality amount of loss and have different reasons of larger uncertainties
- Coated surface phase map data have large systematic errors (over estimation) in the short wavelength region (<5mm).

measured aLIGO test mass PSD

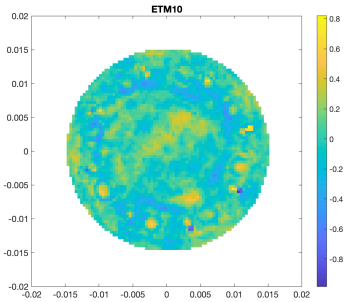


LIGO Fizeou IFO
Instrument transfer function

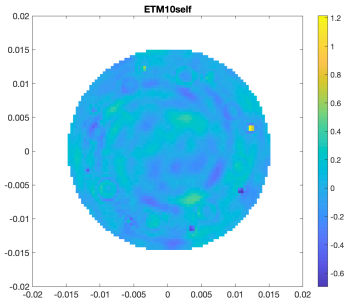


O3 ETM maps

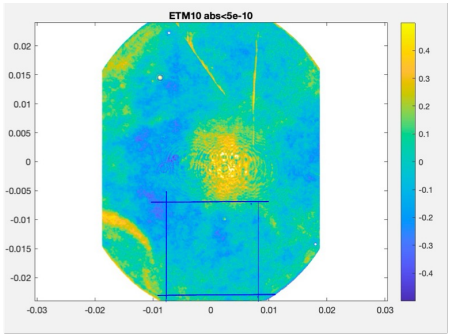
x1 map

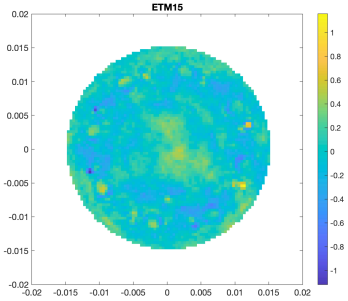


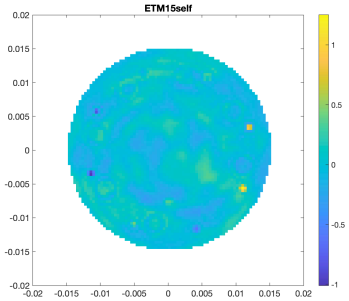
x1 self ref

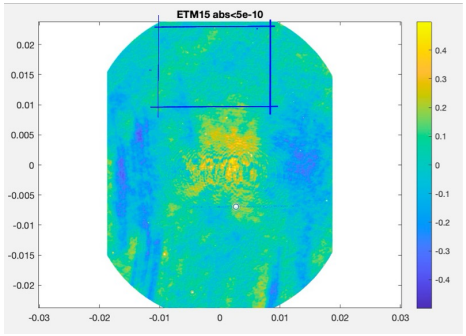


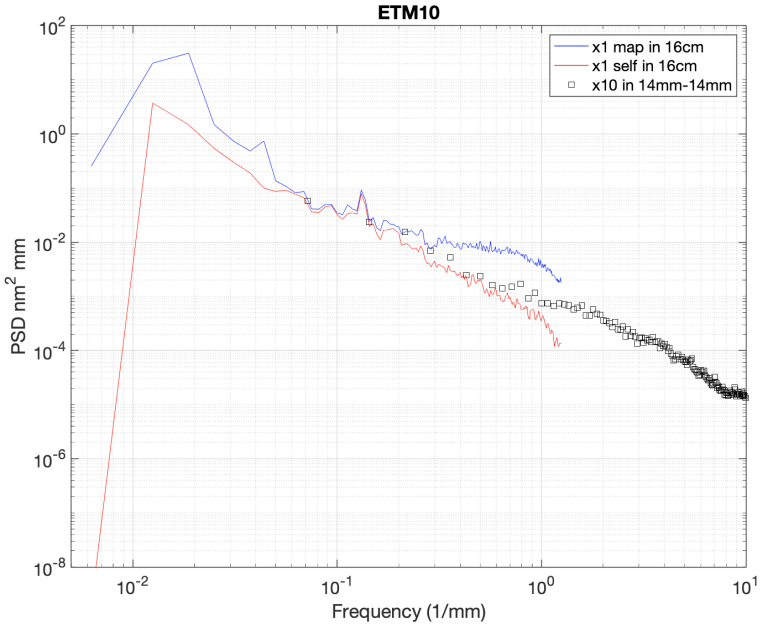
x10 map

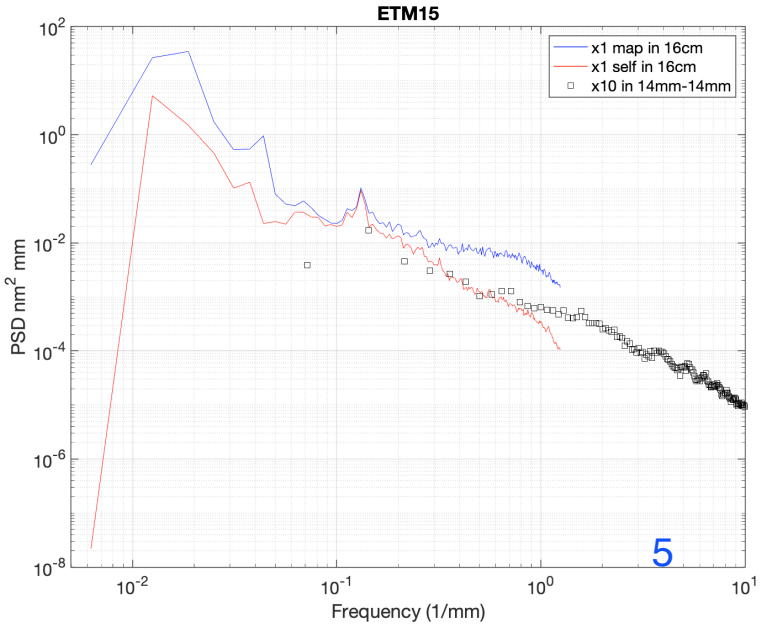




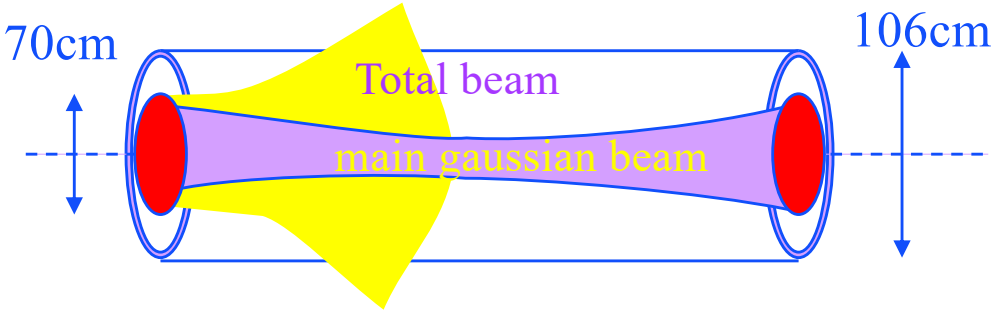


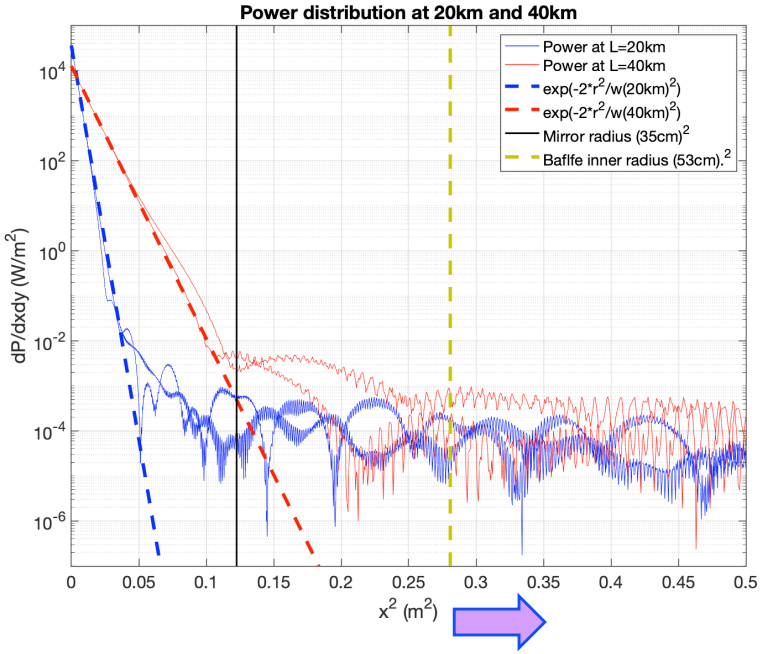






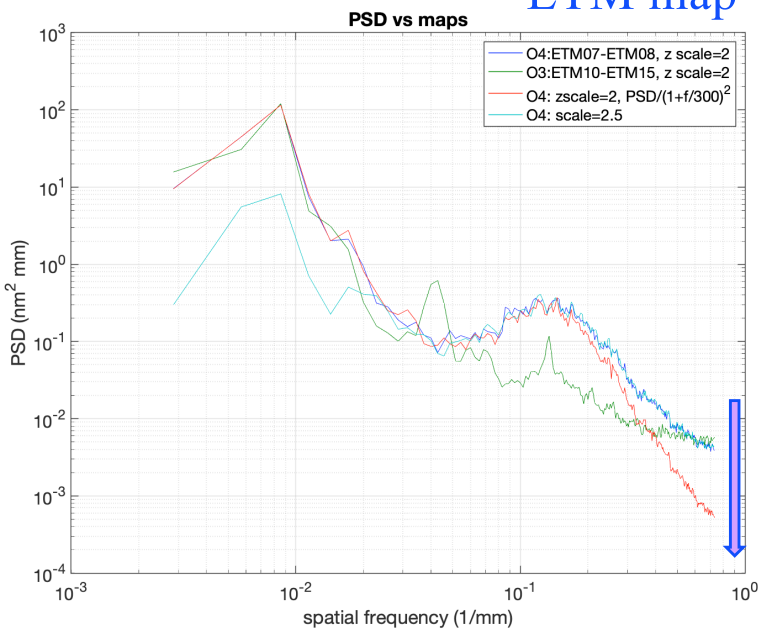
Mirror maps and loss





loss = P(r>53cm)/P(ITM)

ETM map



Field from ITM to ETM