LLO PRMI Contrast Defect simulation > data

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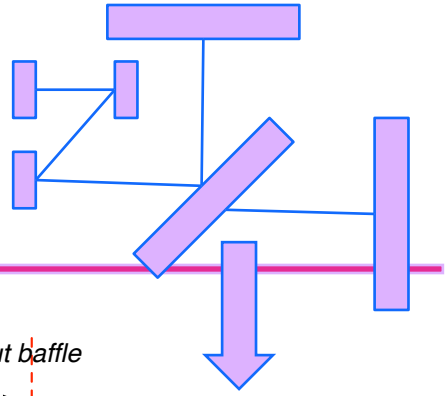
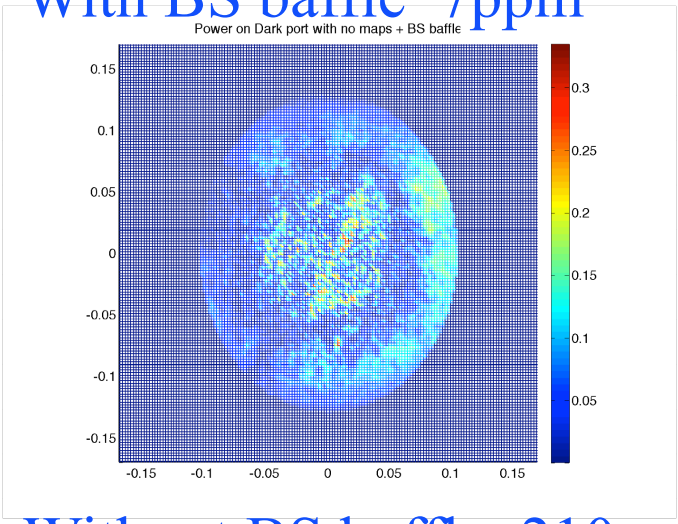
- 200ppm is the measured best contrast defect.
- ITM substrates are approximated by lens, and the RoC of ITMX is changed by RH, the contrast defect comes down to be
  - » 200ppm when beam splitter baffles are NOT attached,
  - » 7ppm when BS baffles are attached. I.e., the effect of the difference of the ITM substrates can be fully compensated by RH.
- 1300ppm when all maps, ITMs, CPs and BSs, are included.
  - » Just ITM8 (ITMY) transmission map alone is enough to make CD as bad as 600ppm. This map has a nice plateau within an aperture of 10cm and changes rapidly outside. This is one cause of the large CD in the simulation.
- Beam pointing etc seems to be reasonably OK.
- I would like to hear any suggestions to find the cause of this big discrepancy.

Ideal case : ITM=lens

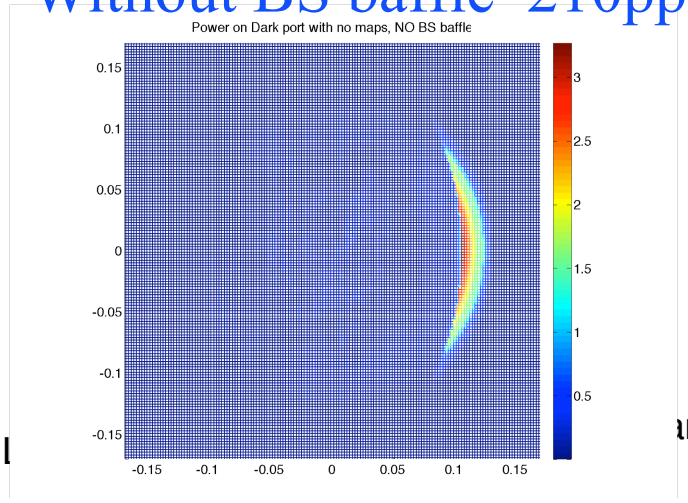
ITMx:RoC=302km, ITMy:-82km

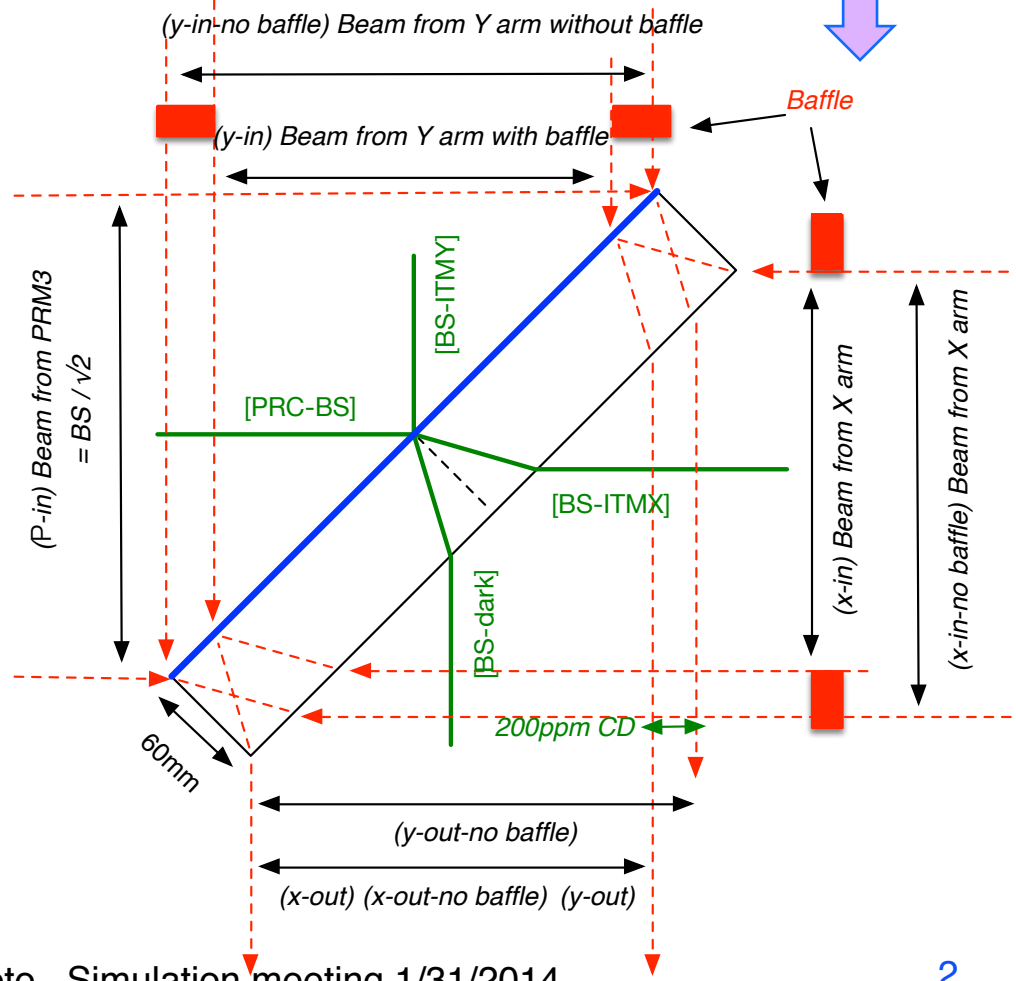


With BS baffle 7ppm



Without BS baffle 210ppm

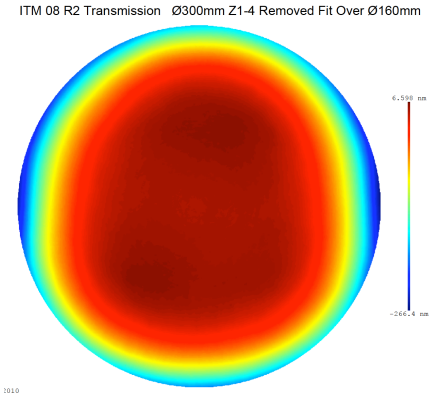




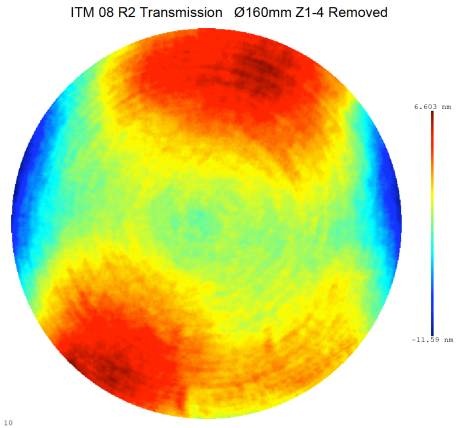
ITM transmission maps

ITM08 / ITMY

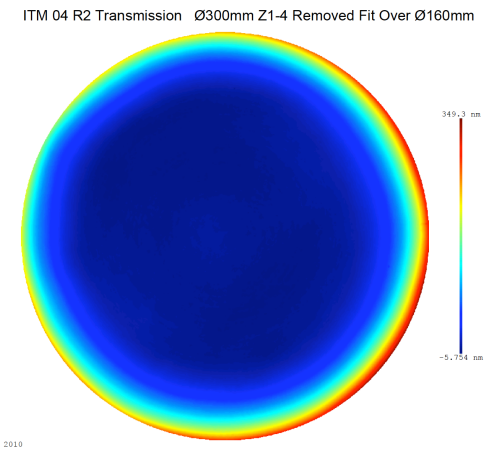
ϕ=300mm

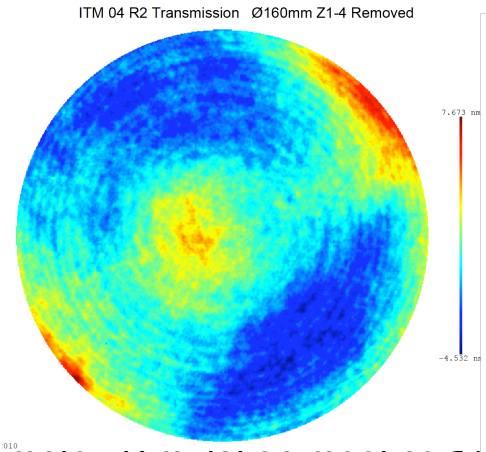


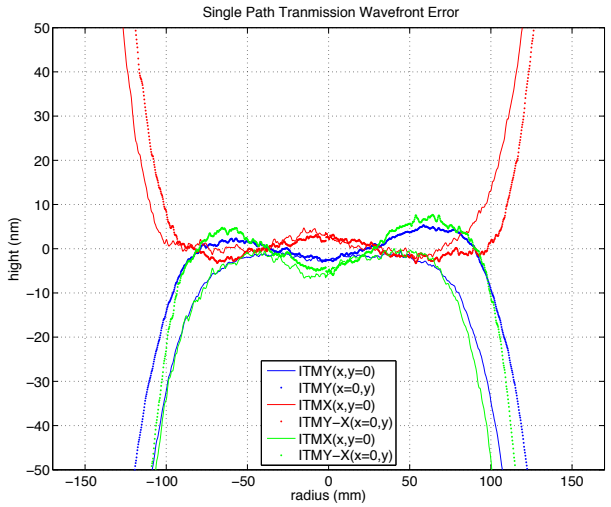
ϕ=160mm



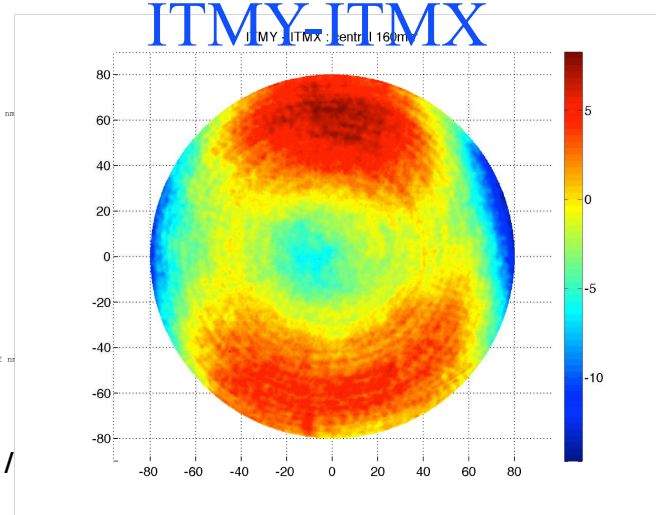
ITM04 / ITMX



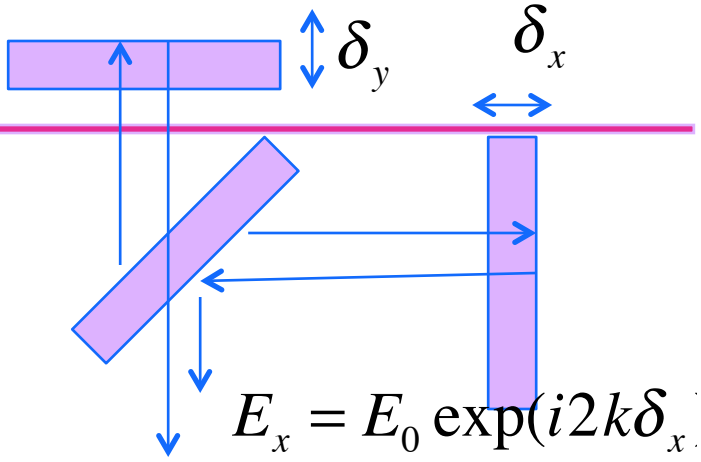




ITMY-ITMX



Back of the envelope vs FFT

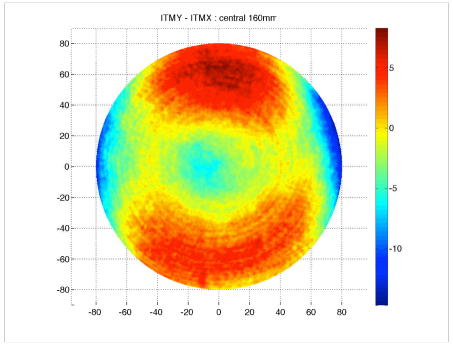


$$CD = Power(E_x - E_y) / Power(E_x + E_y)$$

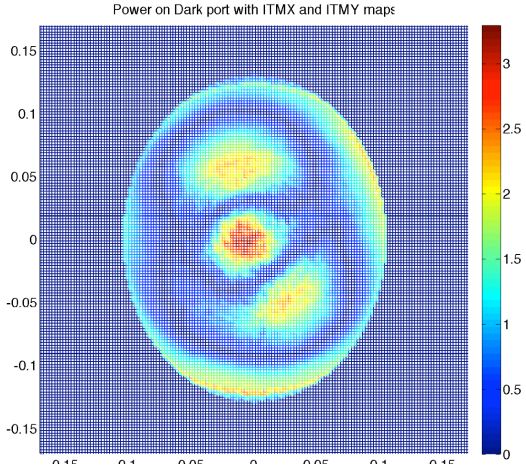
$$= \int dx\,dy (2k)^2 \frac{2}{\pi w^2} \exp(-2\frac{r^2}{w^2})(\delta_x(x,y) - \delta_y(x,y))^2 / 4$$

	W=7cm ITMX	W=7cm ITMY	W=7cm ITMX&Y	W=5.3 ITMX&Y
simple	1200	1900	5500	440
FFT	320 ppm	570	1370	120

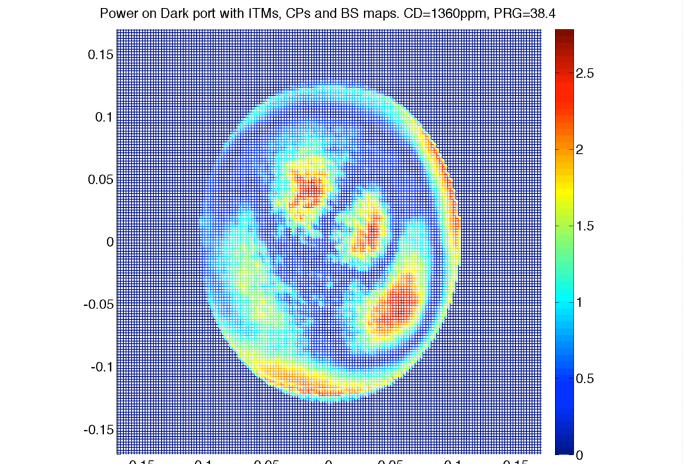
$\delta_y - \delta_x$



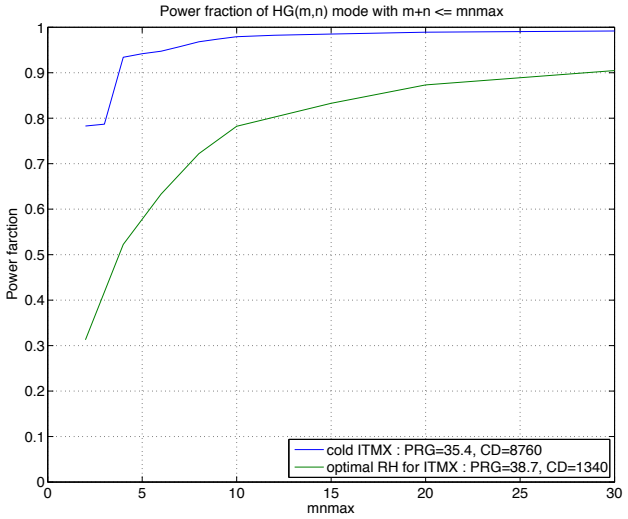
FFT w/ ITMx/y maps



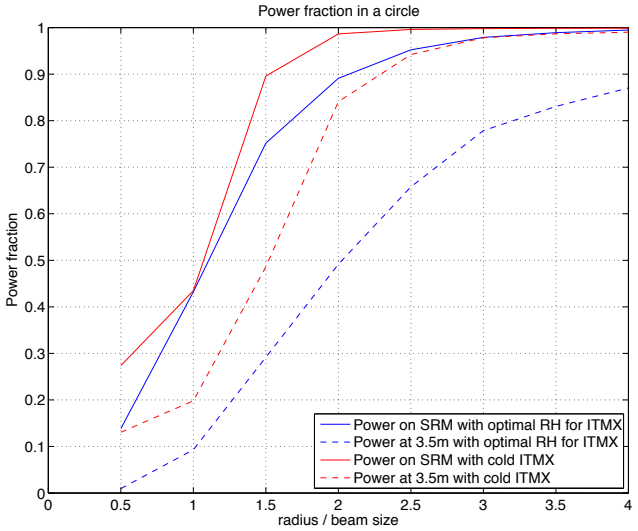
FFT with all maps (1300ppm)



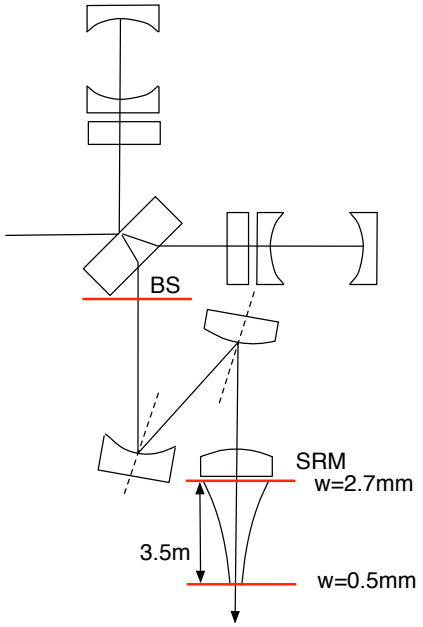
High order modes and spreading



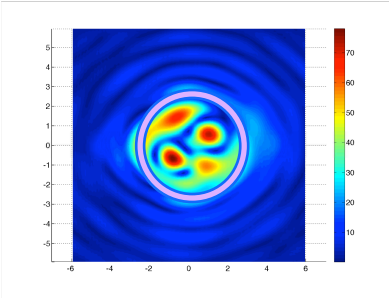
Modes at the dark port of BS



Fraction of energy in a circle



Cold case field is dominated by lower order modes due curvature mismatch



Field with RH on ITMX spreads more

Spreading of the dark port field

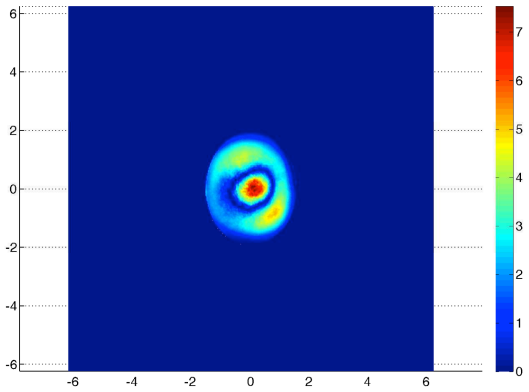
axis : in units of beam size (6w x 6w)

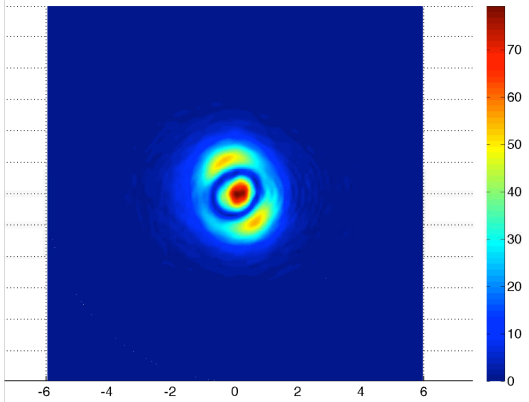
BS dark port

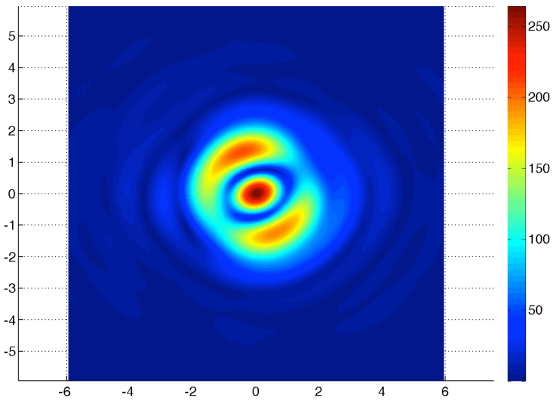
SRM

3.5m from SRM AR

Cold case : CD=8760







Optimal RH : CD=1340