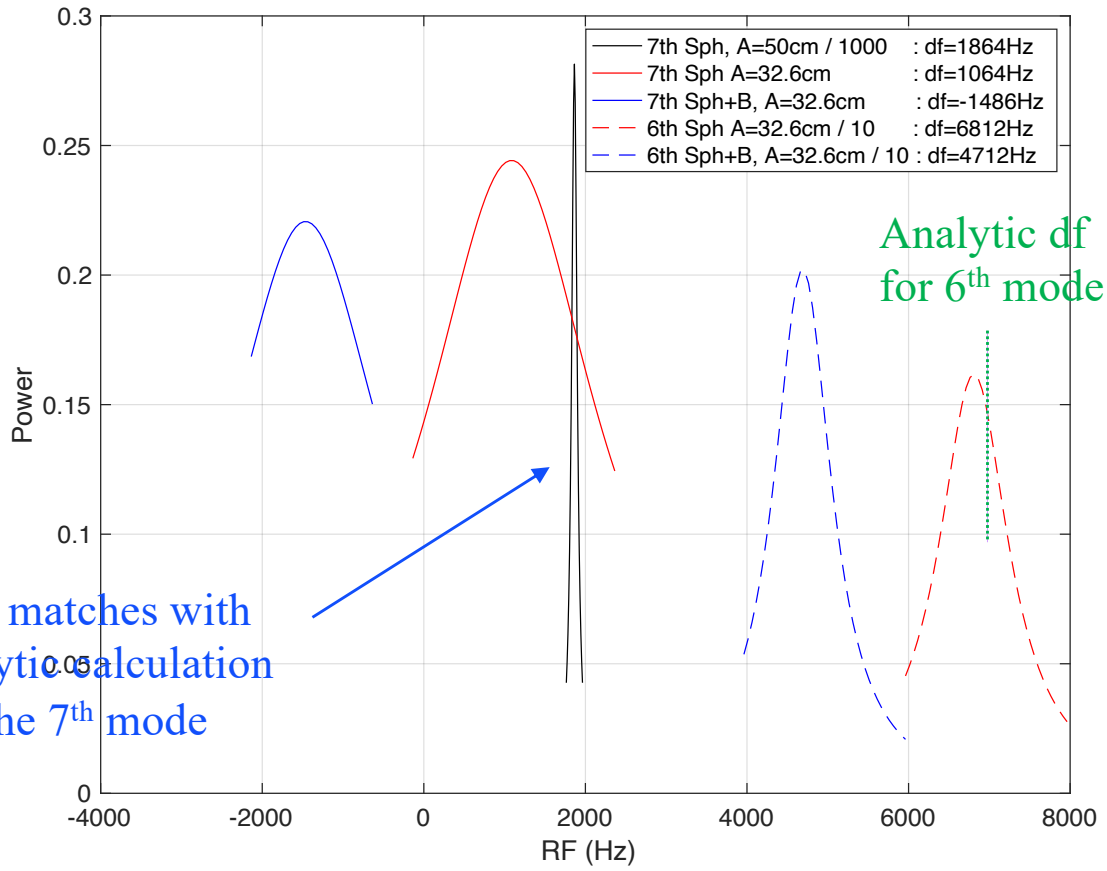
Answer to recommendations

- For this case, what is the eigenfrequency for the 6th & 7th order modes (delta_f from the TEM00 mode)?
  - » df is not all to determine the mode gain
  - » loss or width or coupling to other modes matter

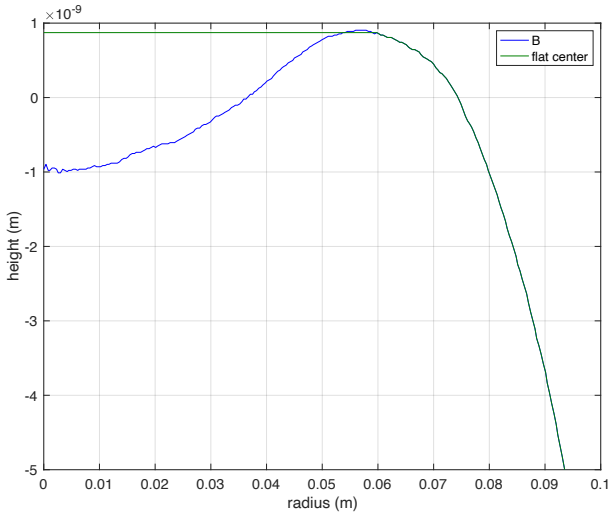


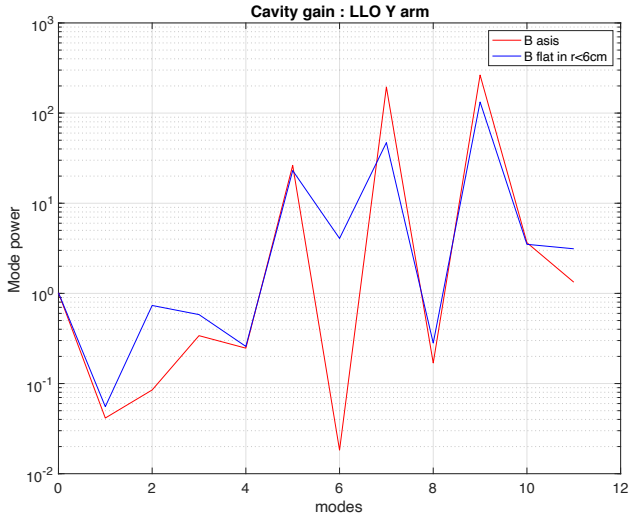
Answer to recommendations

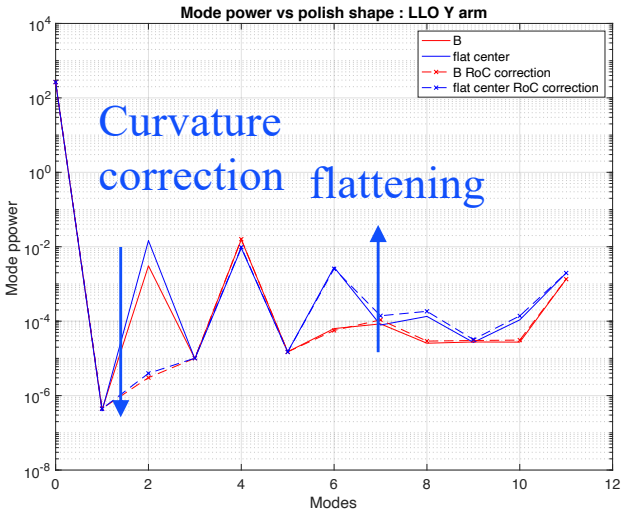
- G2001747-v3, slide 32, upper right plot. Is there any understanding why the RTL for the solid purple curve is lower than for the solid red curve for offsets greater than 2.5 cm ?
  A : there was a bug to setup a FP cavity with offset. Needs to be redone.
- Also why is the RTL for the dashed cyan curve higher than for the solid cyan at zero offset?
  A : see the answer in the last page. The thermal bump by the coating absorption distorts the field and the edge fall off does not work as is naively expected.
- As the beam is moved, does the absorbed power stay the same, or decrease as it's moved away from the PA?
  A : Power changes as $\exp(-2\, d^2 / w^2)$ where d is the distance between the beam and the point absorber.

Answer to recommendations

- Can you comment on the benefit of retaining or removing the slight spherical aberration, induced by the coating, using a custom polish?
  - » Simply filling the central dip harms => larger 6th mode gain
  - » RTL(flat) is 10% larger than RTL(B)





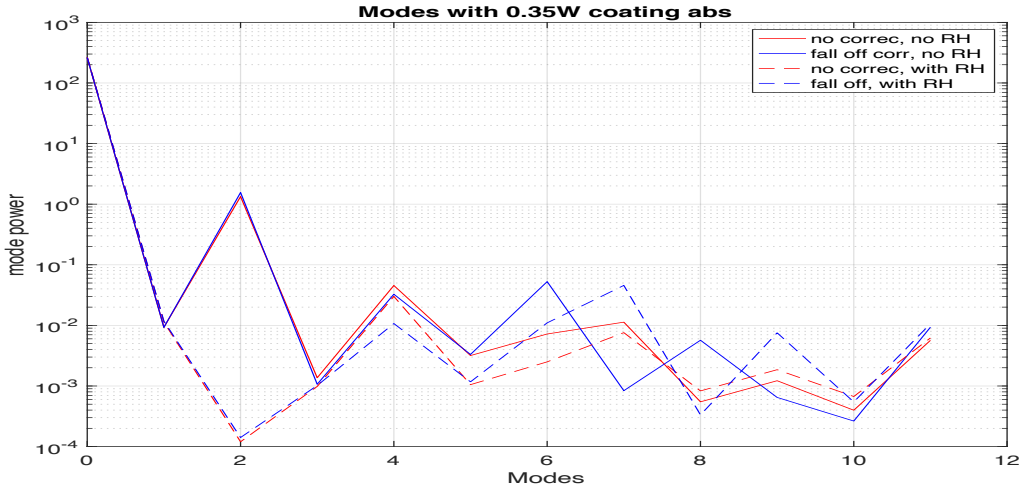


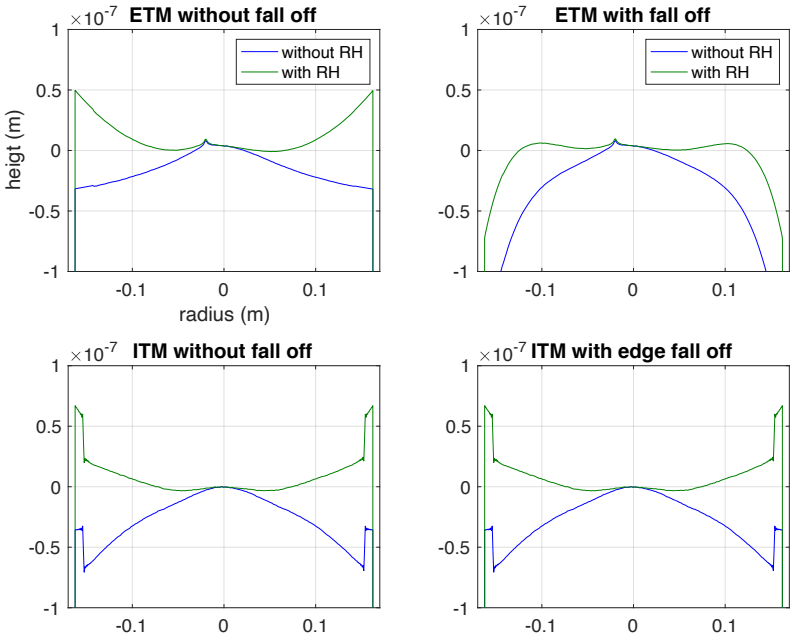
Answer to recommendations

- From G2001747-v3 page 32 - Are labels swapped? Cyan with corr is worse than without at center alignment.

  A: labels are not swapped.

  These are plots of ITM and ETM surfaces with 0.35W coating absorption. Bump at the center by the absorption affects the cavity mode a lot.





- Also plots on slide 2 - are the axes labels swapped?

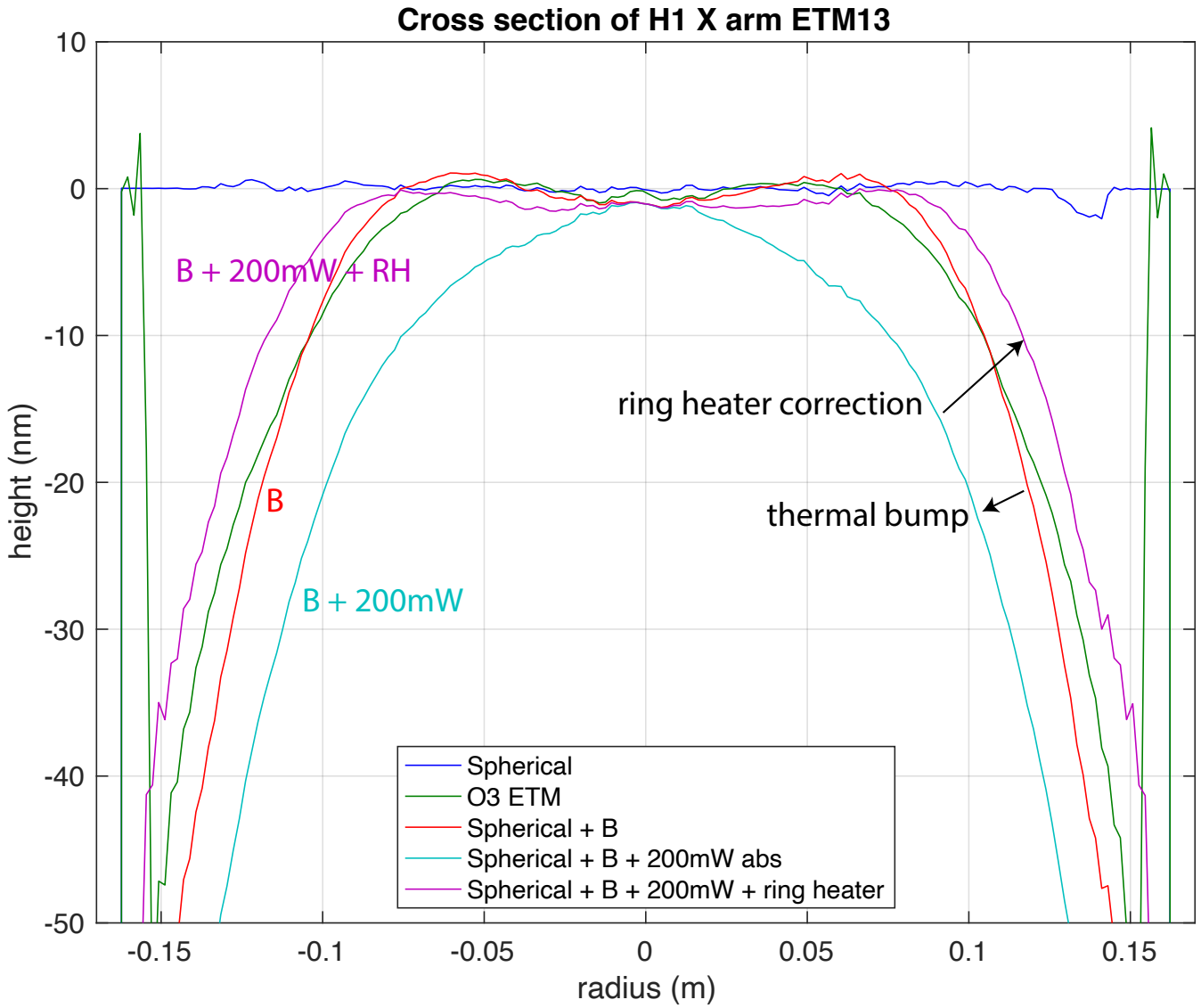
  A : Yes, axes are swapped

Cases studied

100 events generated, up to 4 point absorbers on ETM, at random locations with random power Prand, each PA absorbs Prand*exp(-$2r^2/w^2$) (r is distance between the beam at center and the individual PA).

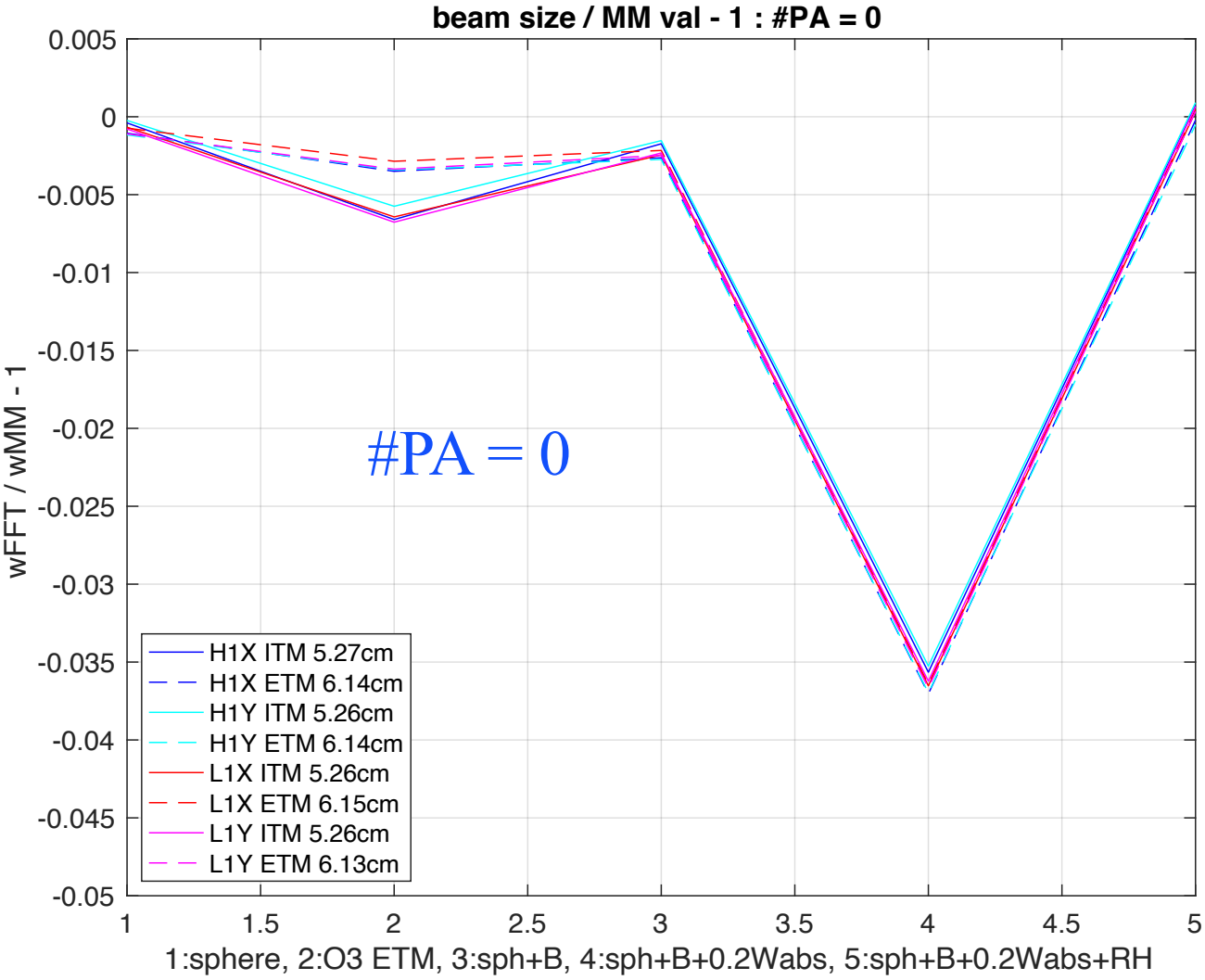
1. ITM (measured map and measured RoC) + ETM sphere (polished surface + measured RoC of the arm)
2. ITM + ETM as measured map and measured RoC
3. ITM + ETM sphere + coating thickness B
4. ITM + ETM sphere + B + 200mW coating absorption
5. ITM + ETM sphere + B + 200mW + ring heater RoC correction

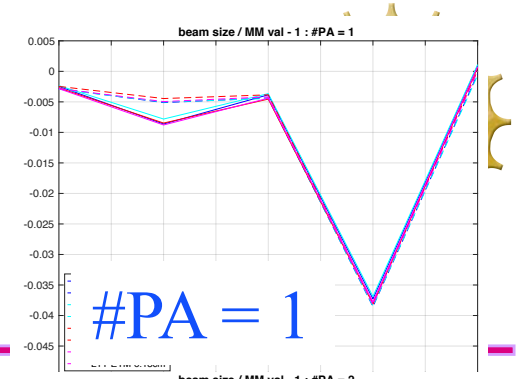
ETM surfaces

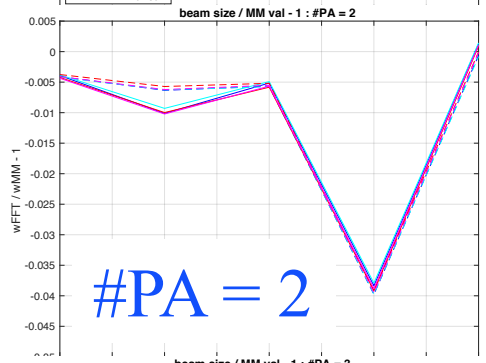


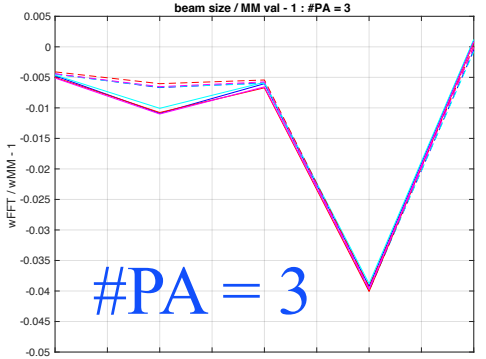
Beam size

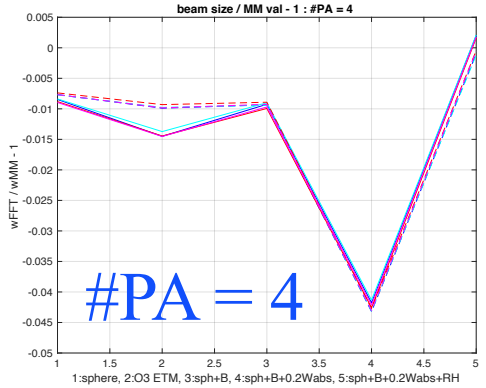
measured beam size / modal model value - 1



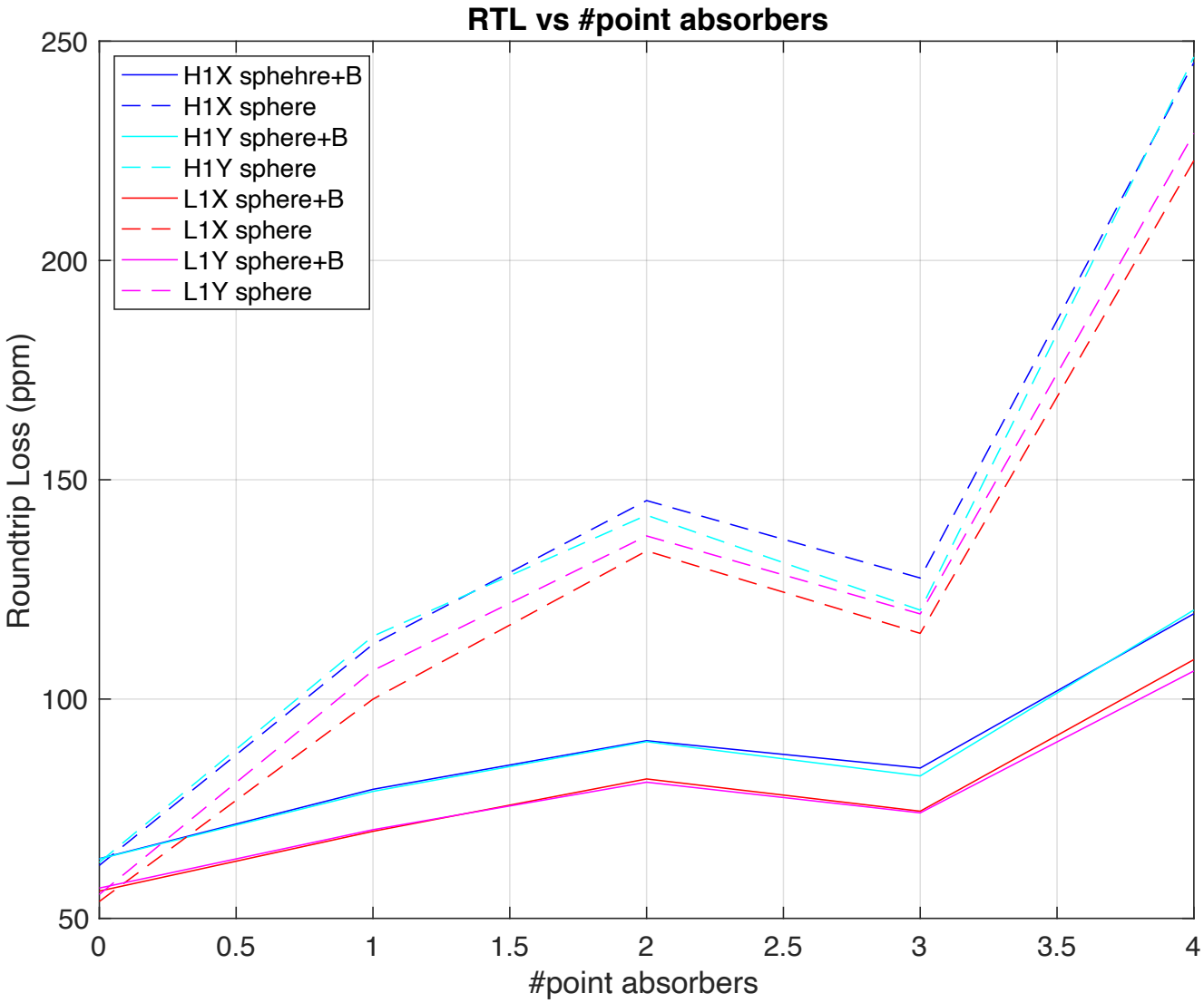




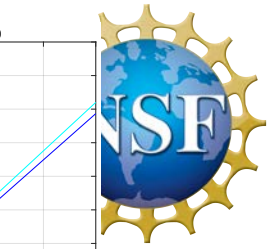


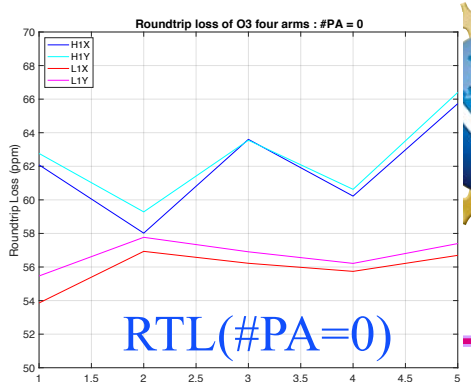


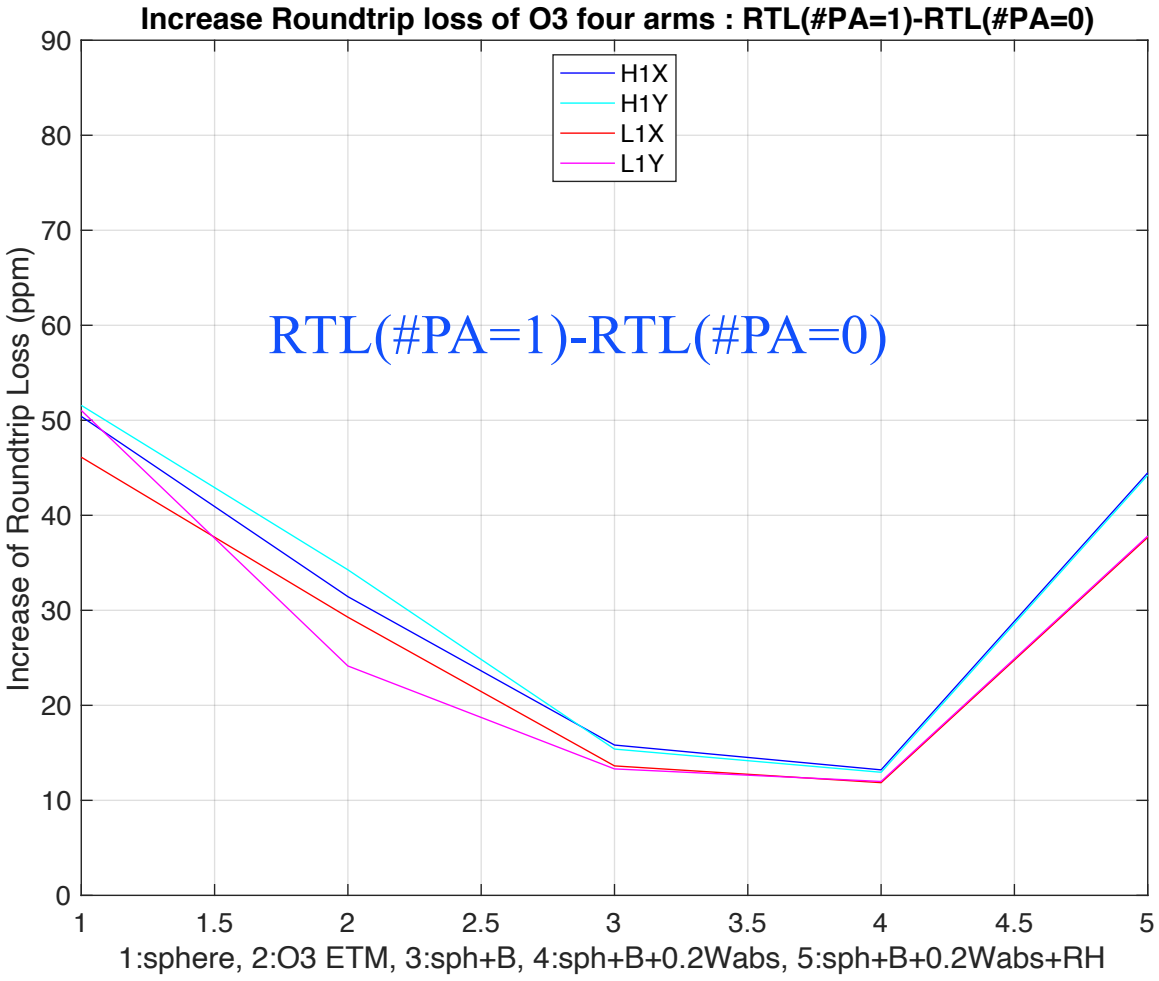
RTL, #PAs and effect of B

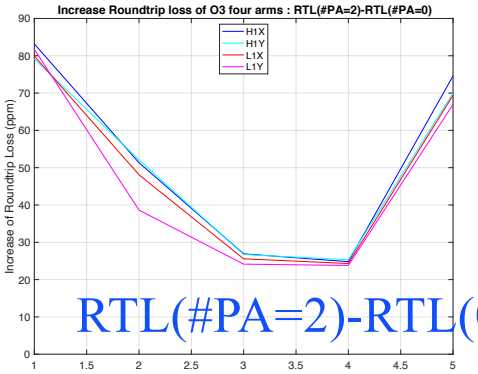


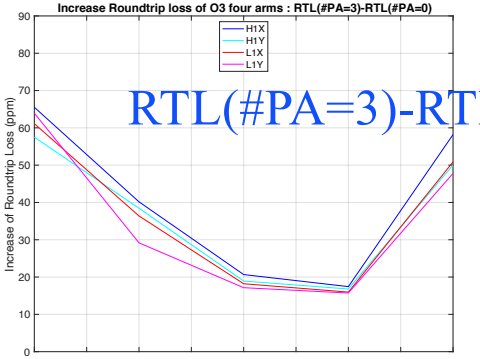
More on RTL vs shape

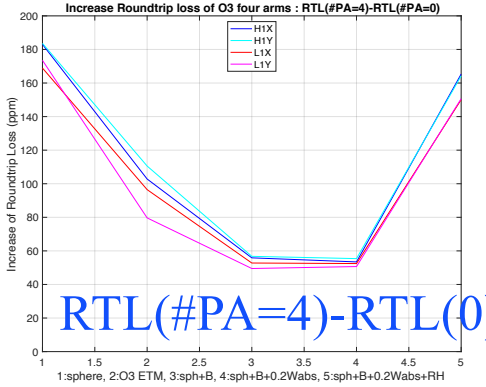






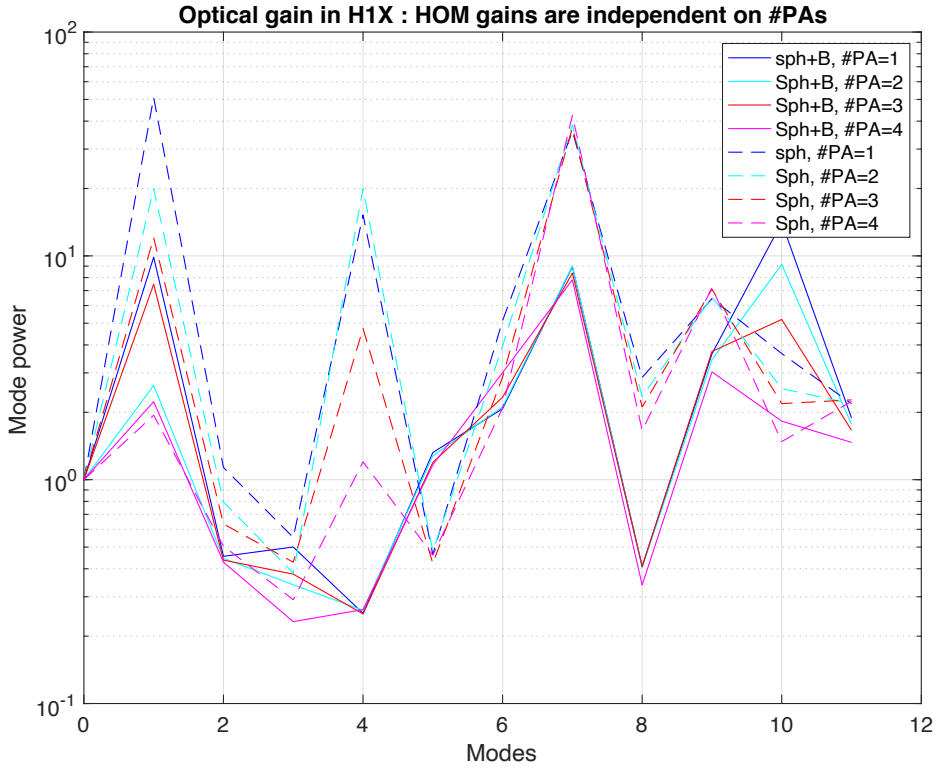


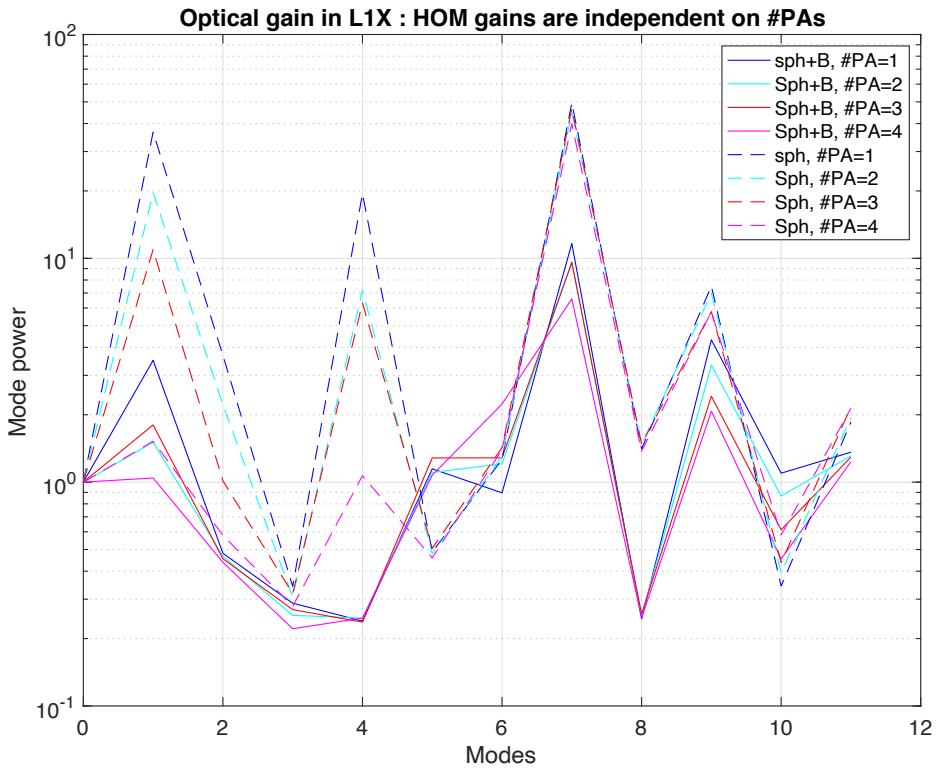




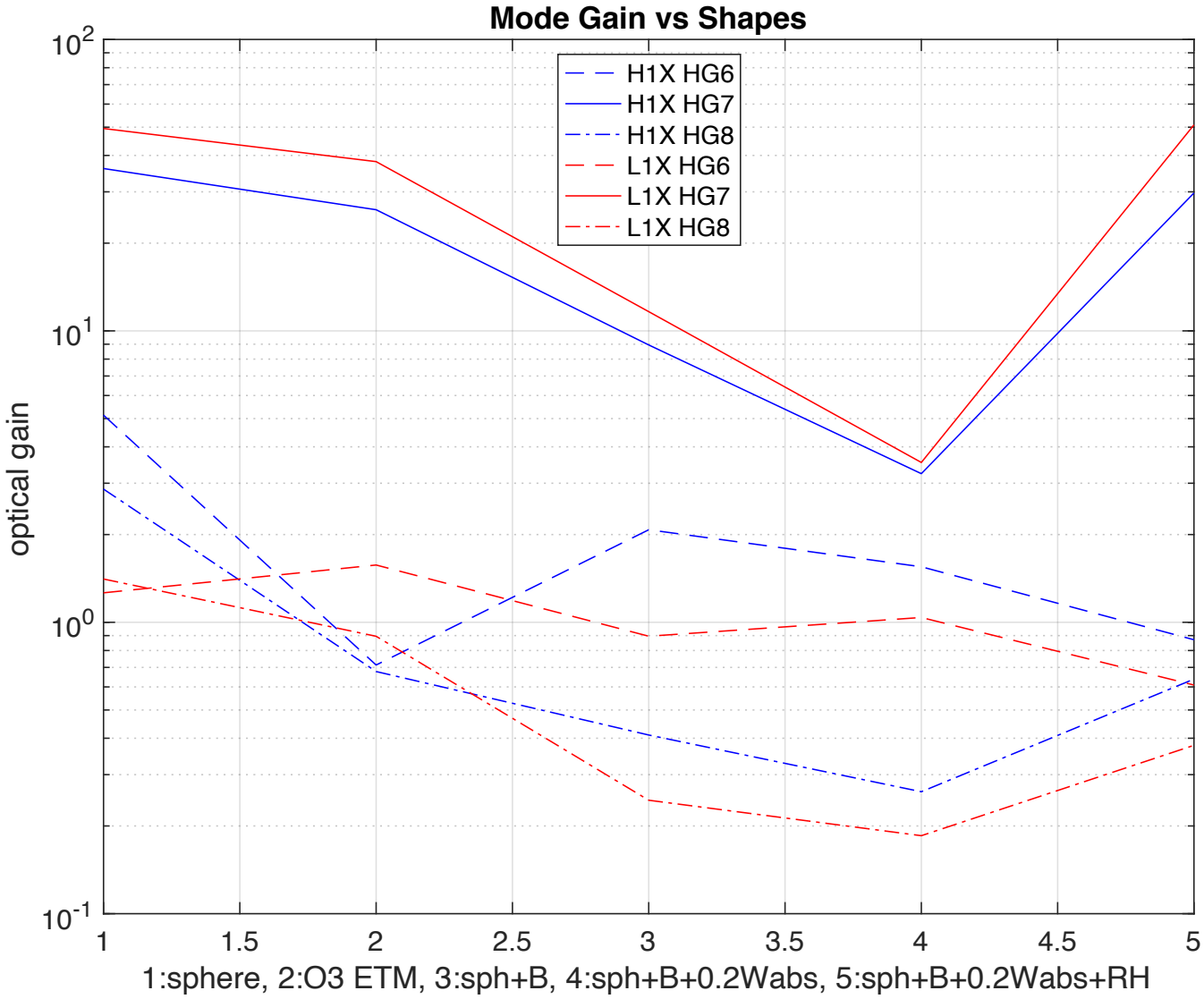
Optical Gains vs Modes

HOM gains are weakly depends on #PAs



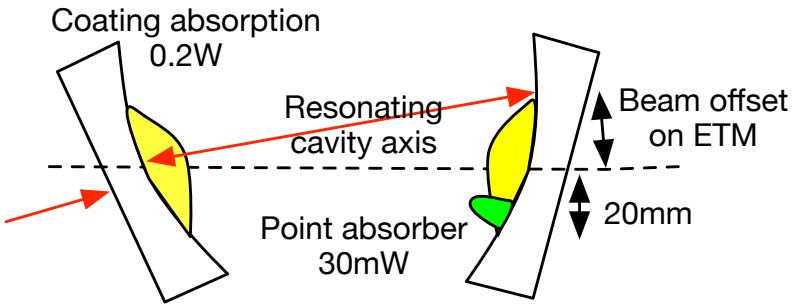


Mode gain vs shape (#PA=1)

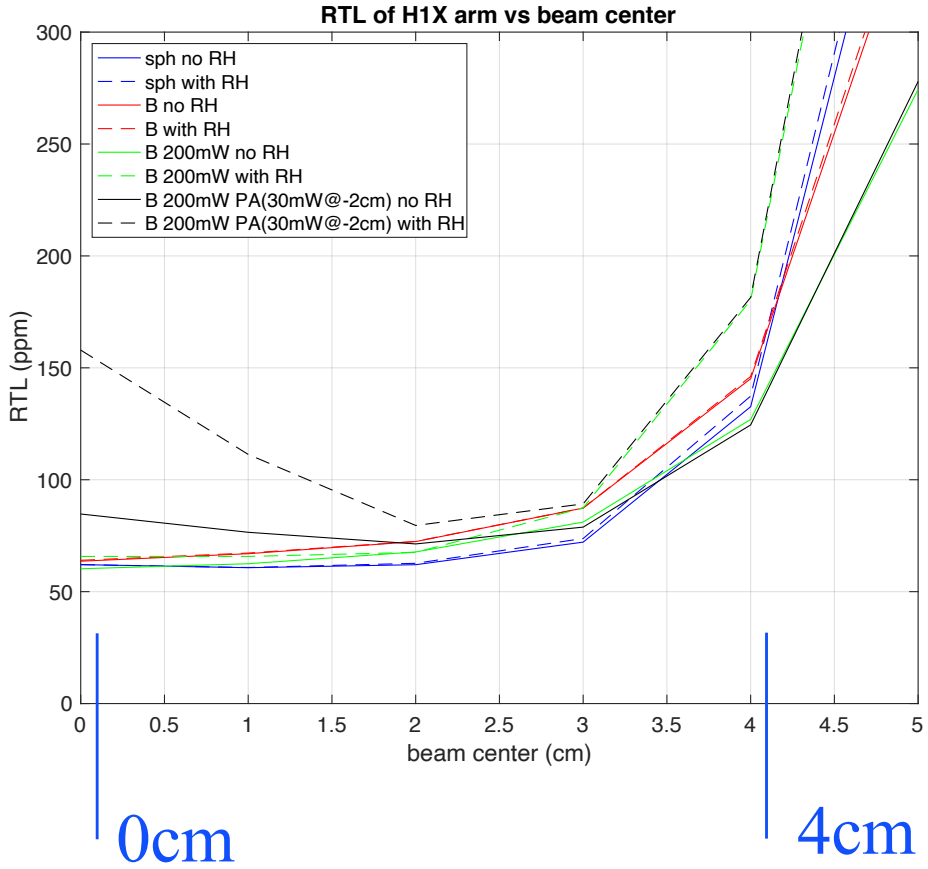


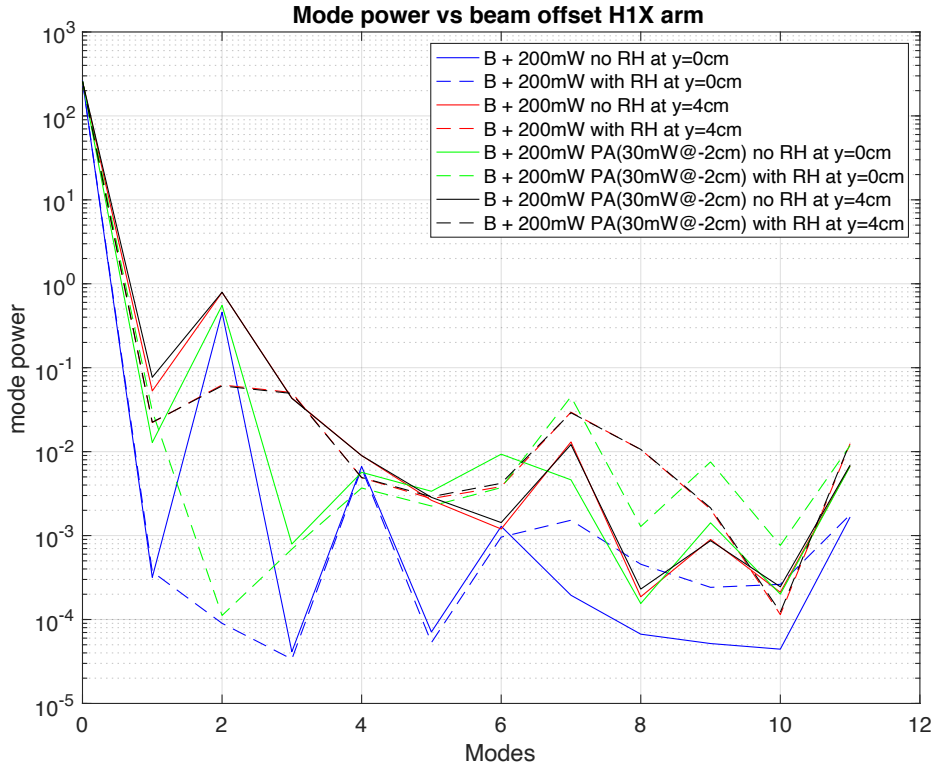
Offset dependence

- PA absorption of 30mW x exp(-2r^2/w^2) is placed at -2cm, where r is the distance between the PA and the beam center
- Beam center is moved away from the PA
- The center of the 200mW thermal bump by coating is the location of the beam on EM
- Mode is calculated using the cavity axis as z axis



RTL vs offset





0cm vs 4cm