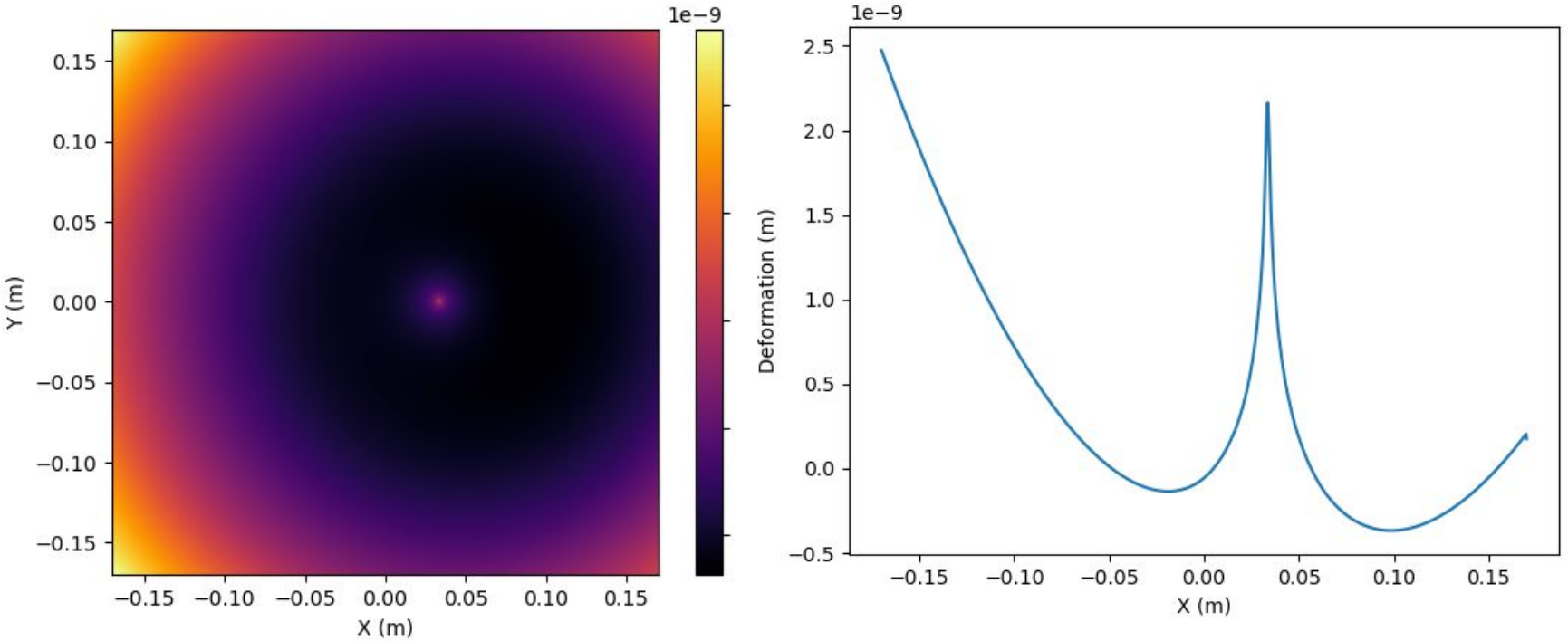
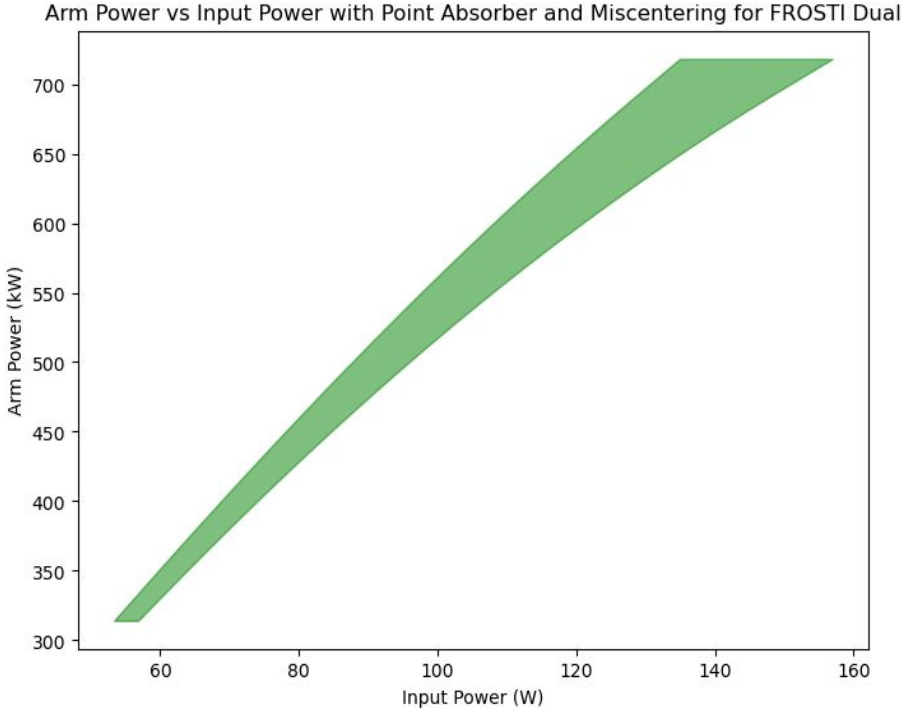
Sample 2D map and cross sections of point absorber map shifted due to miscentering

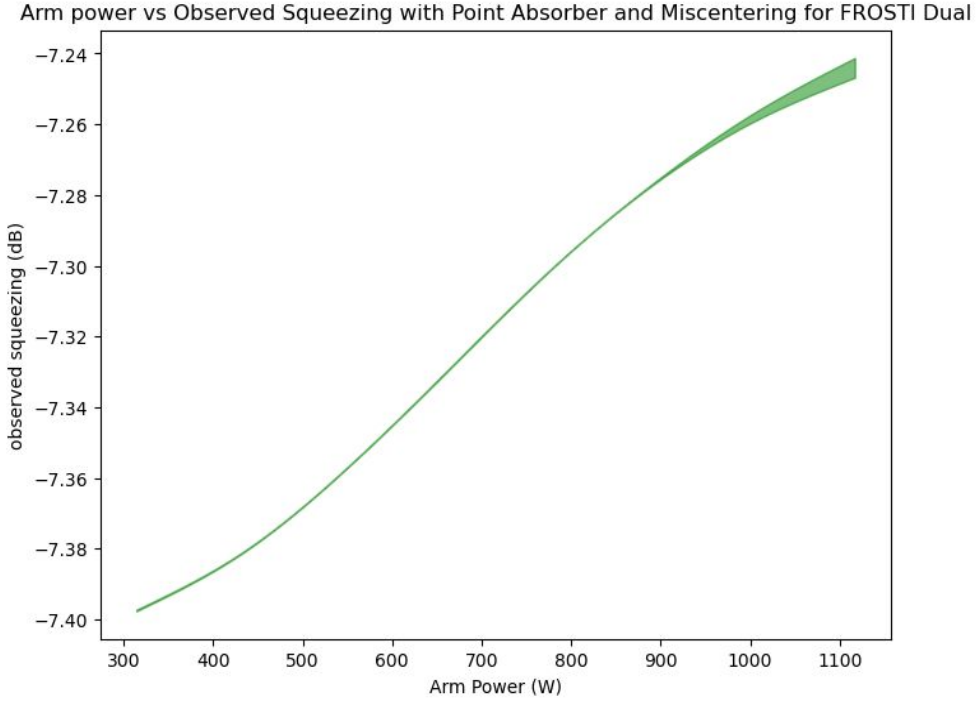


Methods

- Independently varying Power absorbed at HR surface, and calculate arm power under a point absorber by assuming the intensity “seen” within the point absorber is uniform. The arm power then is $$\frac{Phr}{\alpha+(1-\alpha)*\pi\omega_{abs}{}^{2}\frac{1}{\pi w_{beam.}{}^{2}}e^{-(\frac{r_{abs}}{w_{beam}})^{2}}}$$
- Assumed alpha=0.5ppm, absorber width=15 micron, nominal arm power=300KW (used for inferring absorber width from 10mW of absorption)
- Generate a point absorber map at a given location with 10mW of absorption, then the map is rescaled by the arm power/ nominal arm power multiplied by the normalized gaussian intensity at the location of the point absorber, the point absorber map is then added to the rest of the thermal maps
- Since Finesse simulation is around the beam, so beam miscentering is represented by shifting the rest of maps by the miscentered amount

Results


Arm Power vs Input Power with Point Absorber and Miscentering for FROSTI Dual
Arm Power (kW)
700
650
600
550
500
450
400
350
300
60
80
100
120
140
160
Input Power (W)


Arm power vs Observed Squeezing with Point Absorber and Miscentering for FROSTI Dual
observed squeezing (dB)
−7.24
−7.26
−7.28
−7.30
−7.32
−7.34
−7.36
−7.38
−7.40
300
400
500
600
700
800
900
1000
1100
Arm Power (W)

Next steps/Concerns

- Now expand simulation to more miscentering/ptabs points
- Rerun simulation with coatings
- Include all other cases too (ie current TCS, ITM FROSTI, cold)?
- The point absorber map is later interpolated to make sure all maps have matching size, I made it so that once the map is shifted, all data that is before out of the aperture (but now within due to the shift), 0, but looking at the cross section and the 2D map, it seems like there are small rises around the edge, so making those data 0 might create a sharp drop.
- Do I need to remove curvature for this point absorber map, or can I just add it to the rest of the thermal map first, and remove curvature all together? What about remove tilt? The concern is beam miscentering is effectively tilting the mirror until the beam is no longer at the center, so is remove tilt still necessary?