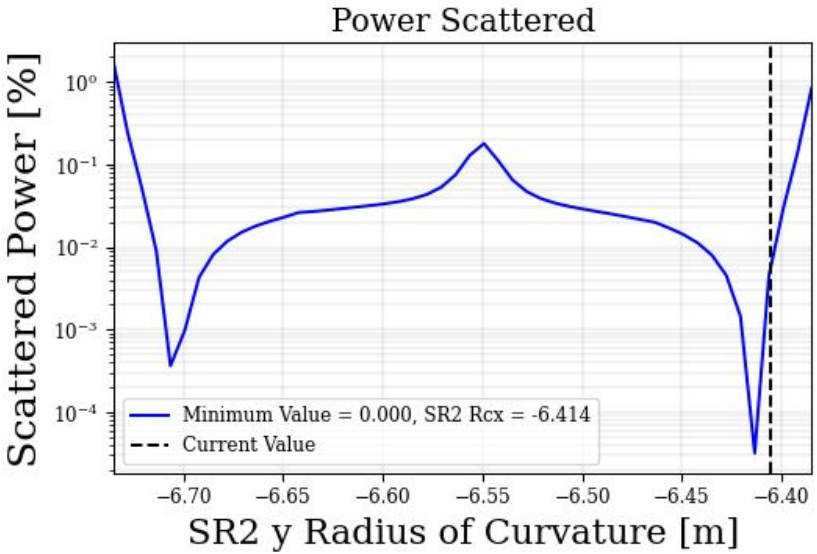
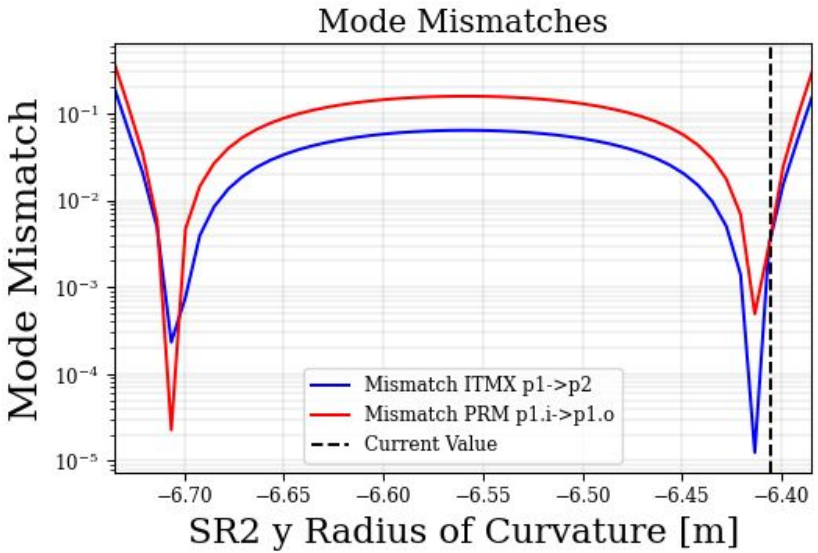
Full ALIGO Interferometer Simulations

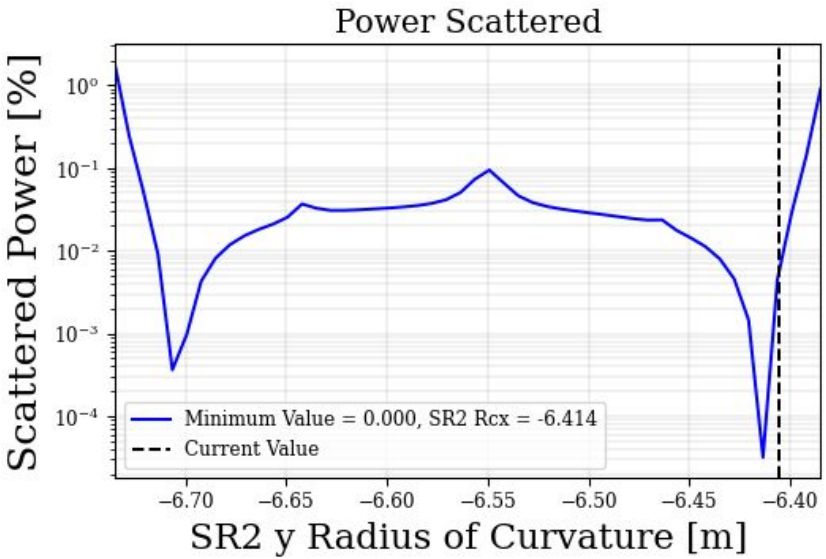
Varying Rcy of SR2 with 2 arm cavities and SRC

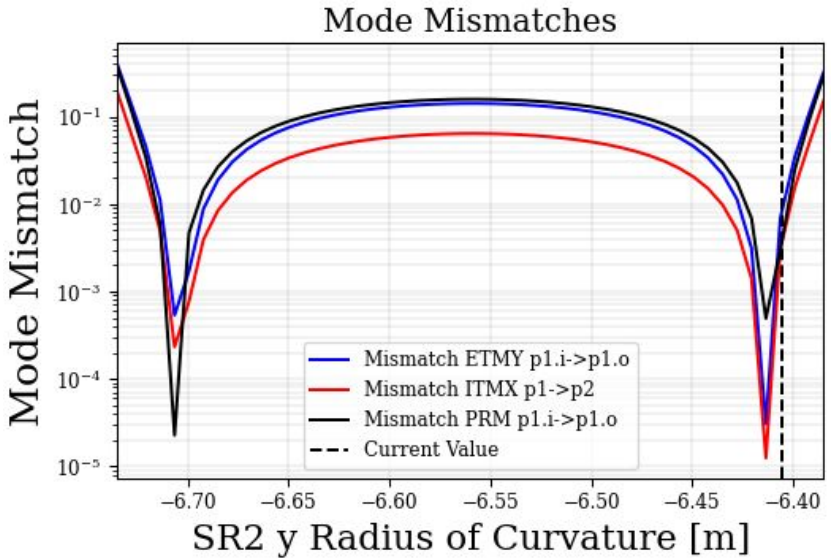




Why is there mismatch on PRM?

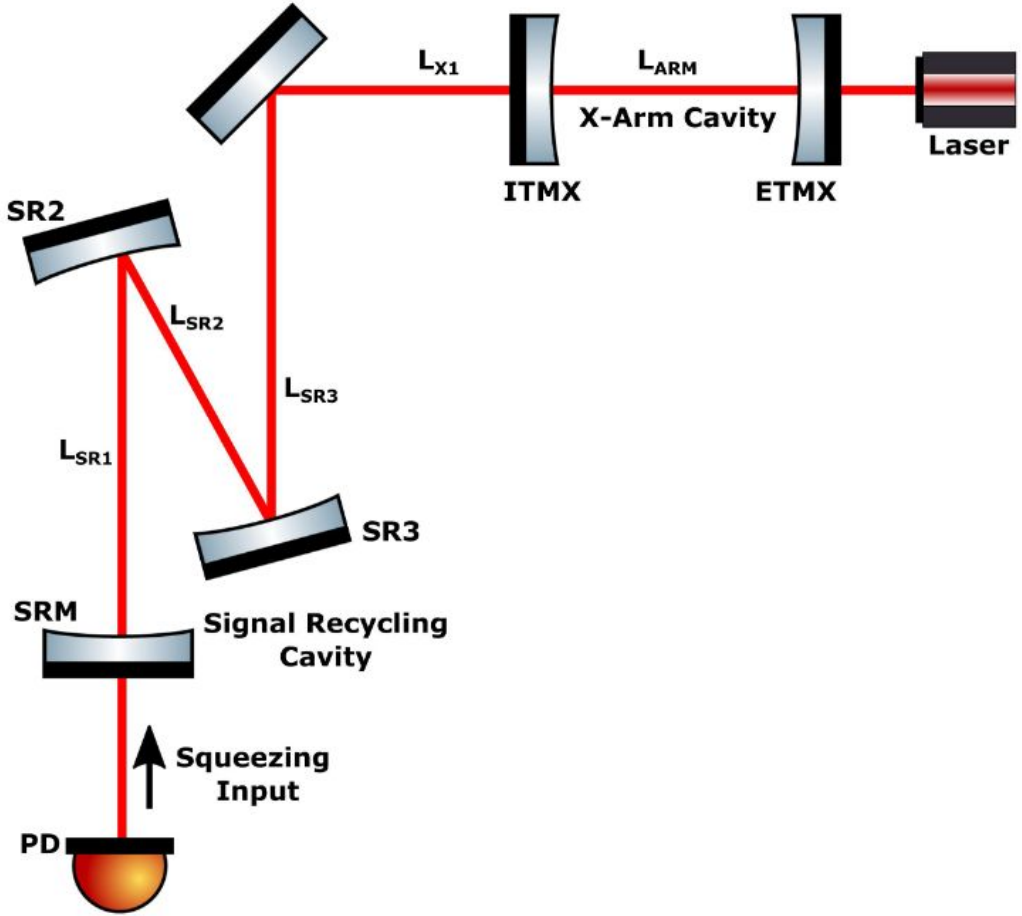
Varying Rcy of SR2 with 1 arm cavity and SRC

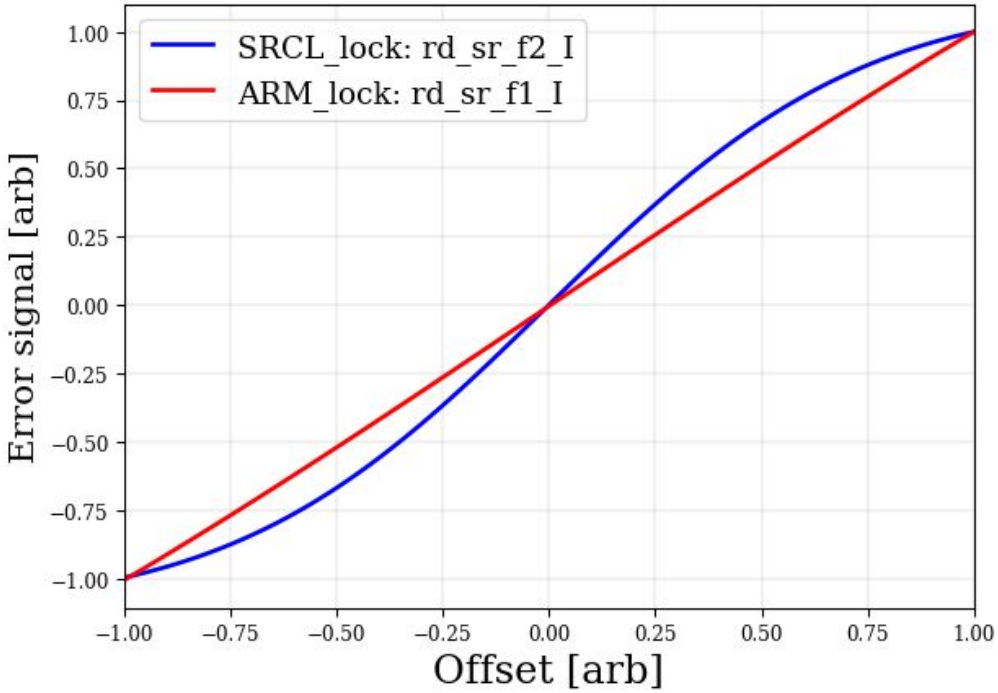


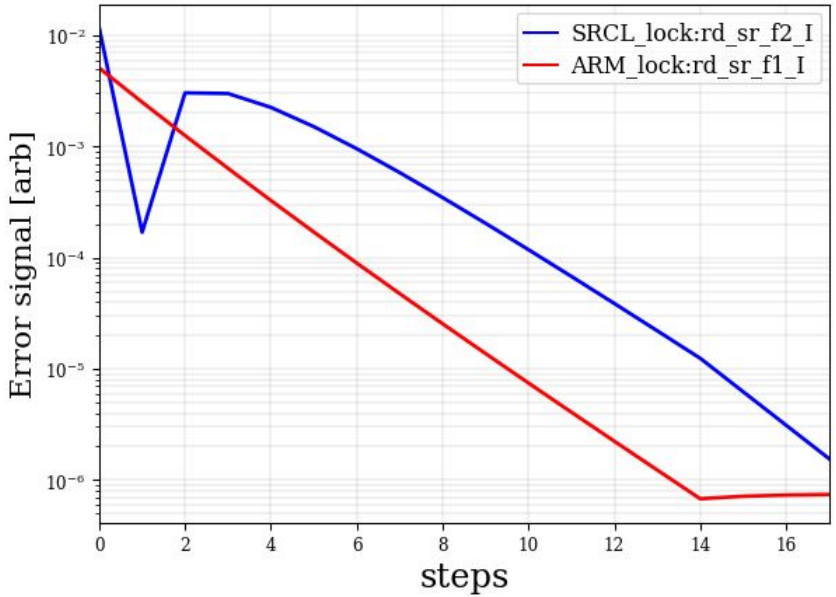


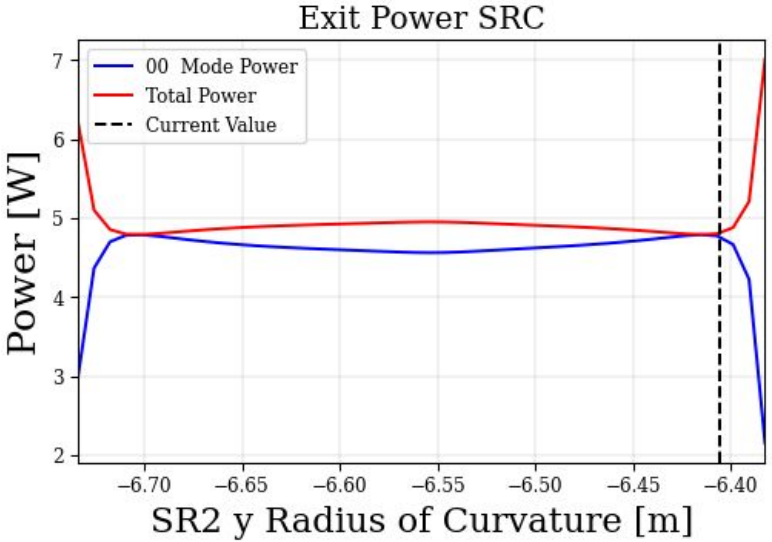
Why is there mismatch on ETMY?

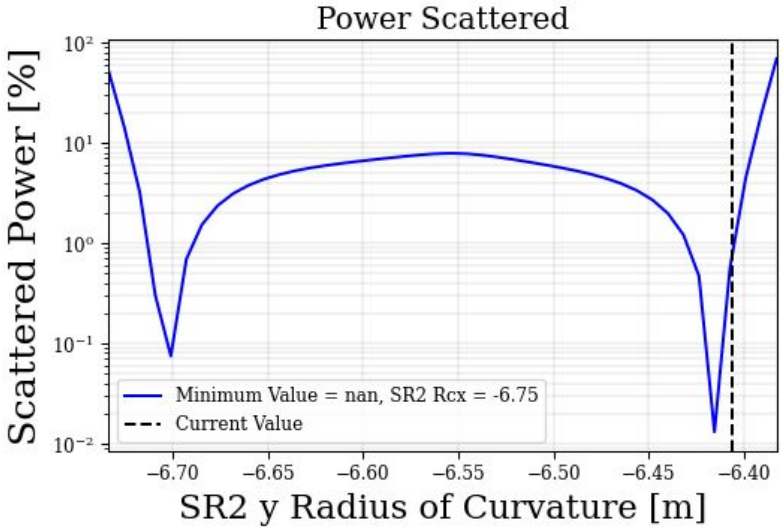
One Arm LIGO Interferometer Simulations

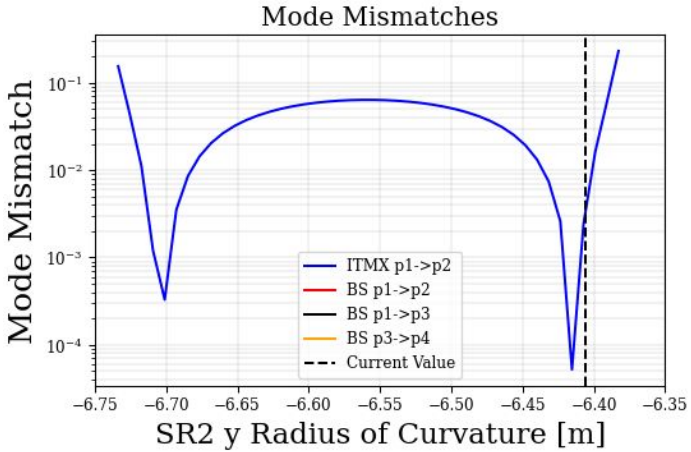

L_{X1}
L_{ARM}
X-Arm Cavity
Laser
ITMX
ETMX
SR2
L_{SR2}
L_{SR3}
L_{SR1}
SR3
SRM
Signal Recycling Cavity
Squeezing Input
PD


SRCL_lock: rd_sr_f2_I
ARM_lock: rd_sr_f1_I
Error signal [arb]
Offset [arb]
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
−1.00
−0.75
−0.50
−0.25
0.00
0.25
0.50
0.75
1.00

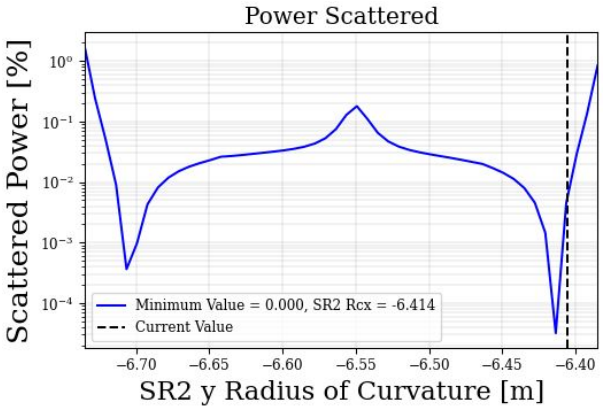

SRCL_lock:rd_sr_f2_I
ARM_lock:rd_sr_f1_I
Error signal [arb]
steps
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
0
2
4
6
8
10
12
14
16


Exit Power SRC
00 Mode Power
Total Power
Current Value
Power [W]
SR2 y Radius of Curvature [m]

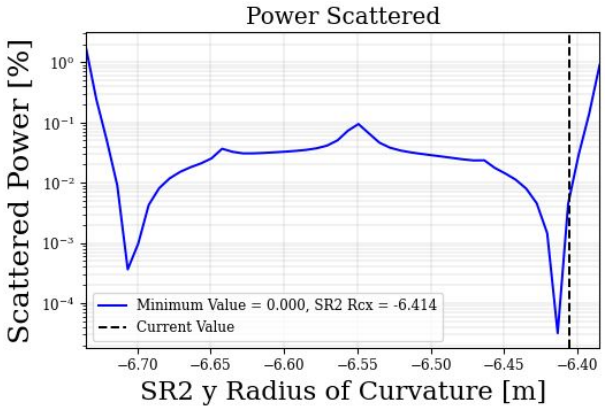

Power Scattered
Minimum Value = nan, SR2 Rcx = -6.75
Current Value
Scattered Power [%]
SR2 y Radius of Curvature [m]


Mode Mismatches
ITMX p1->p2
BS p1->p2
BS p1->p3
BS p3->p4
Current Value
Mode Mismatch
SR2 y Radius of Curvature [m]

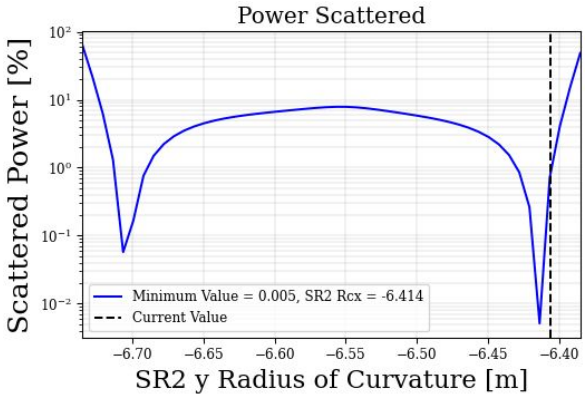
Comparison Check Between Full Interferometer and Simplified Model



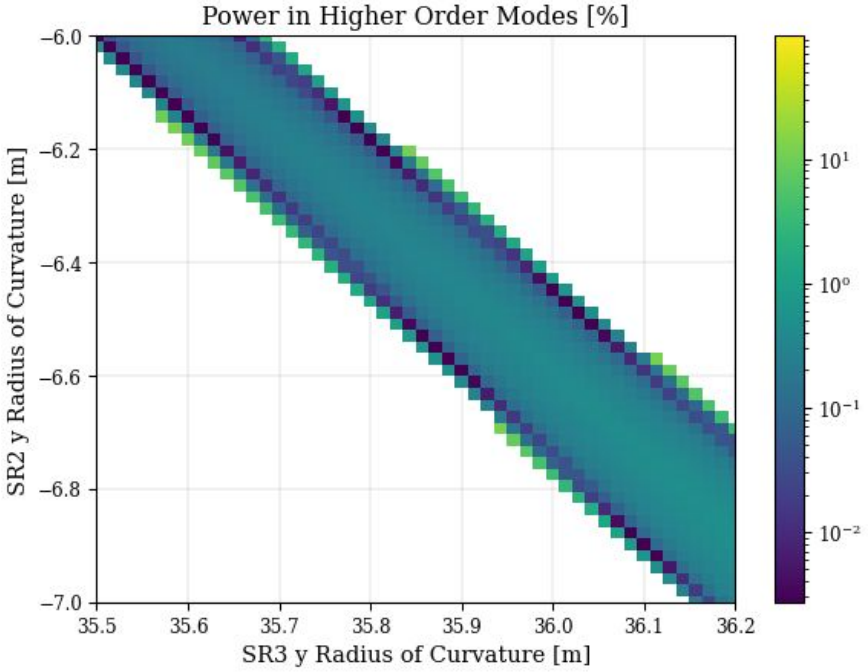
Full ALIGO 2 Arm

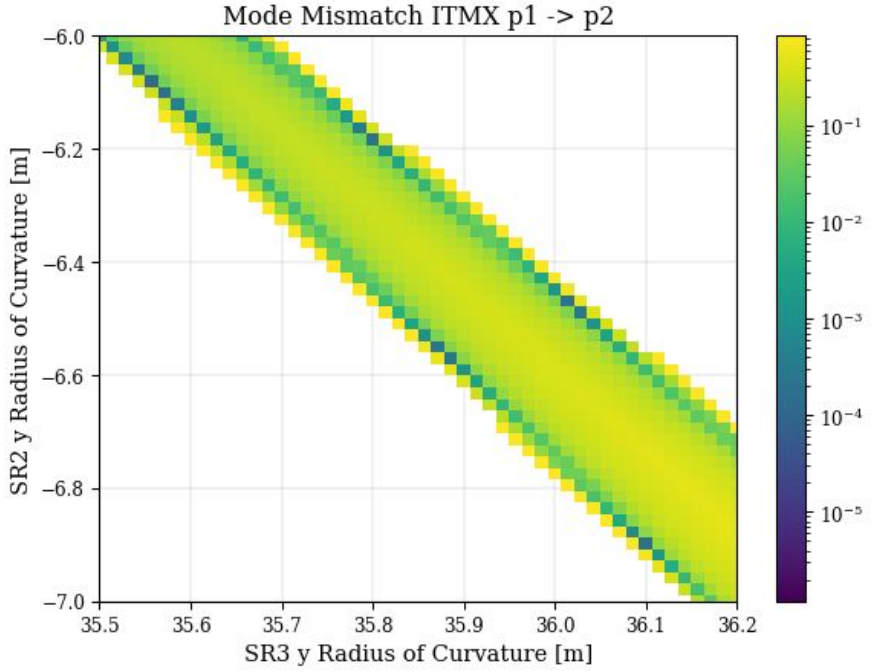


Full ALIGO 1 Arm

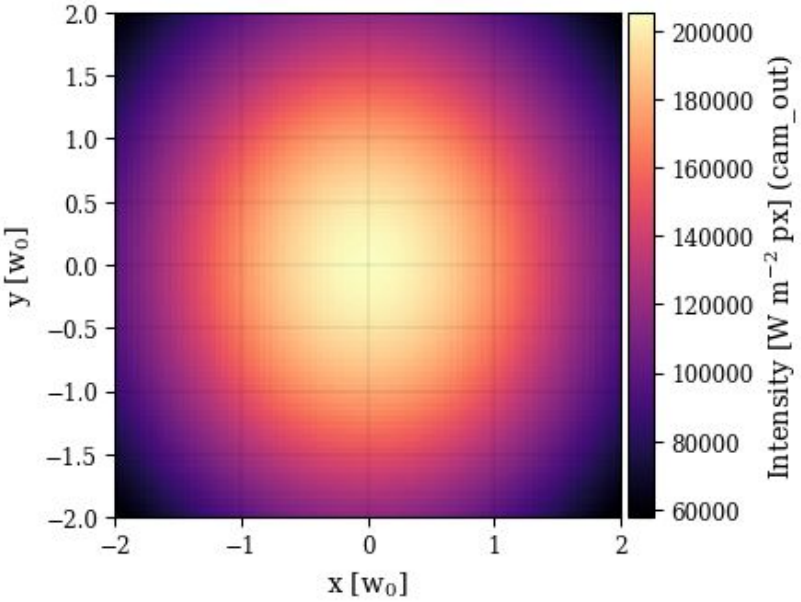


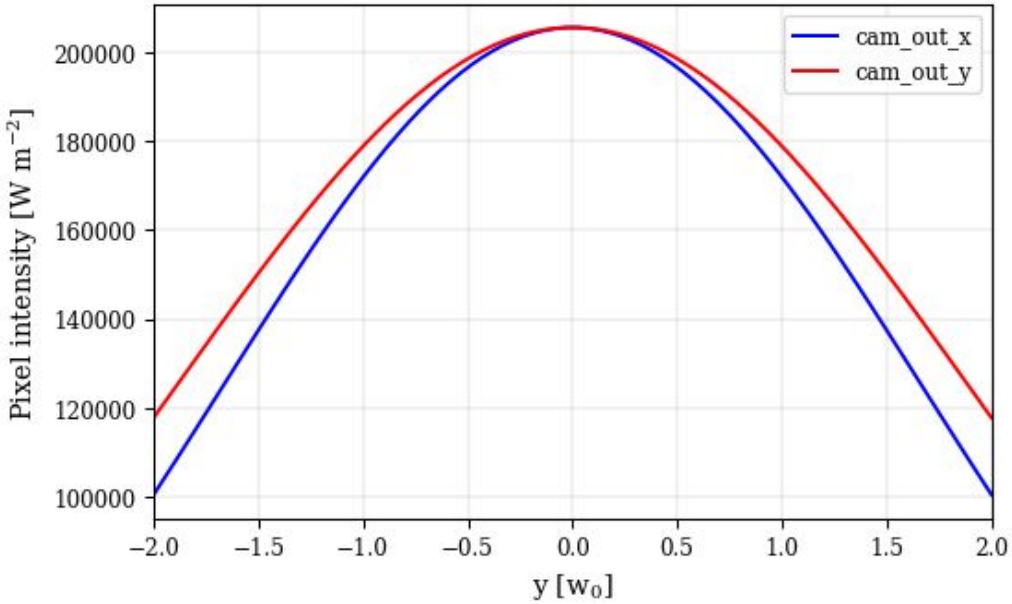
Simplified LIGO 1 Arm


Power in Higher Order Modes [%]
SR2 y Radius of Curvature [m]
SR3 y Radius of Curvature [m]
−6.0
−6.2
−6.4
−6.6
−6.8
−7.0
35.5
35.6
35.7
35.8
35.9
36.0
36.1
36.2
10^{1}
10^{0}
10^{-1}
10^{-2}

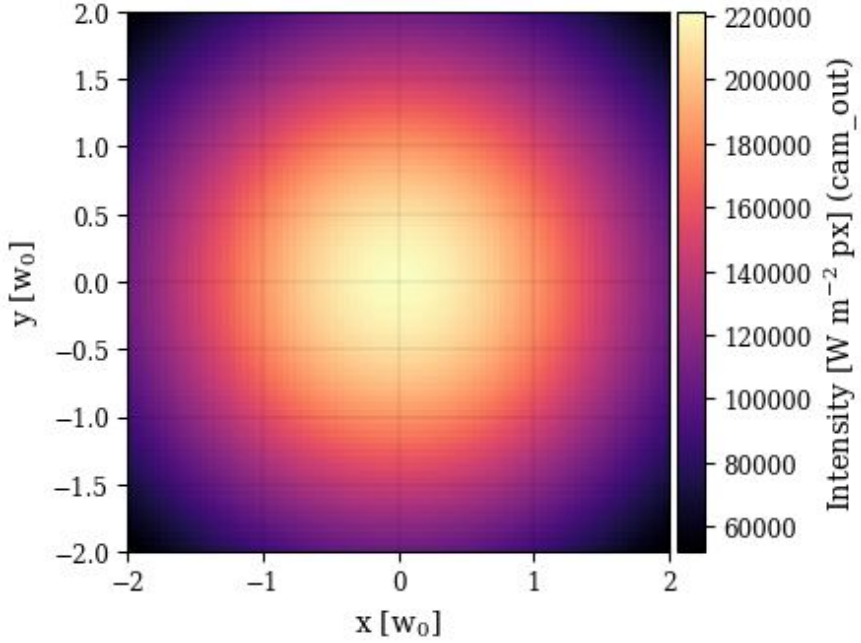

Mode Mismatch ITMX p1 -> p2
SR2 y Radius of Curvature [m]
SR3 y Radius of Curvature [m]
−6.0
−6.2
−6.4
−6.6
−6.8
−7.0
35.5
35.6
35.7
35.8
35.9
36.0
36.1
36.2
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}

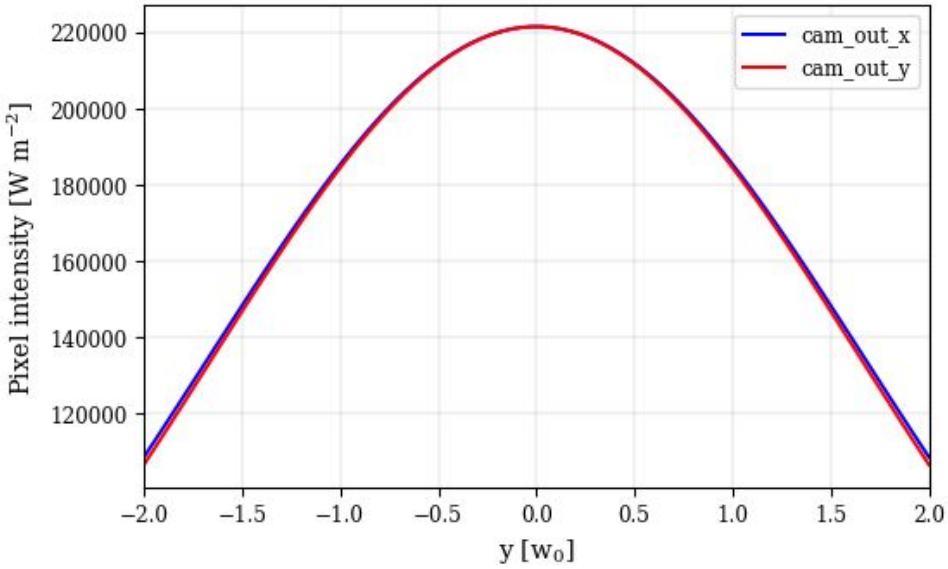
Full Interferometer Intensity Plots



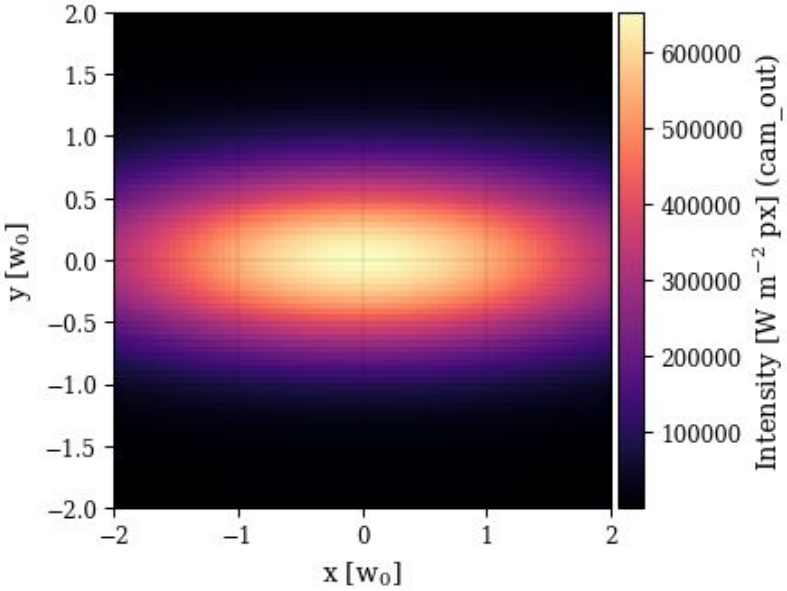


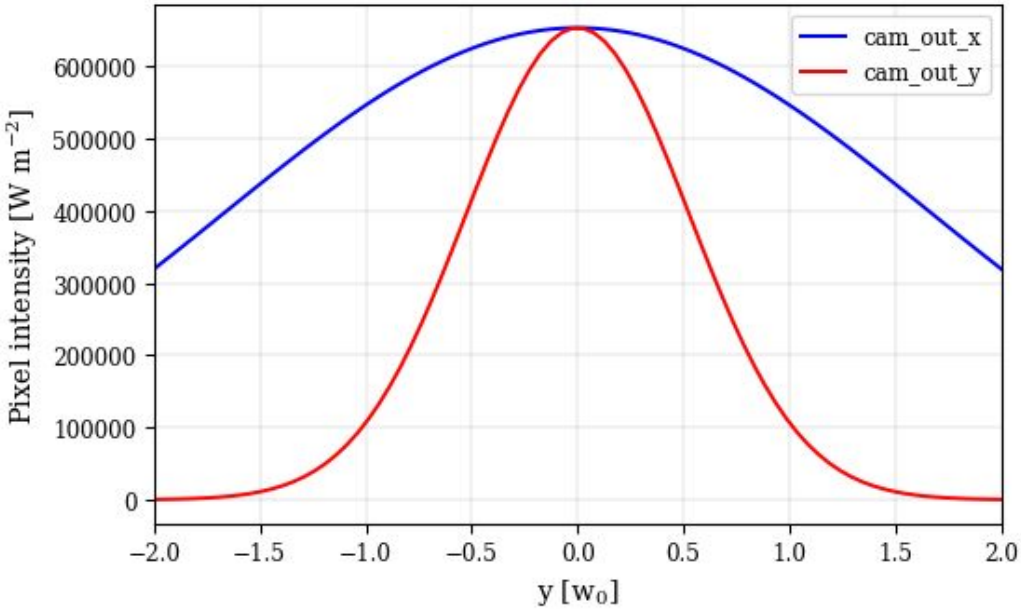
Current State





Near Optimal Point





Alternate Optimal Point

Mode mismatch is near zero, why do we get a very astigmatic beam?

Current Questions:

- How to interpret results? Next steps?