Beam size effect on Signal Loss

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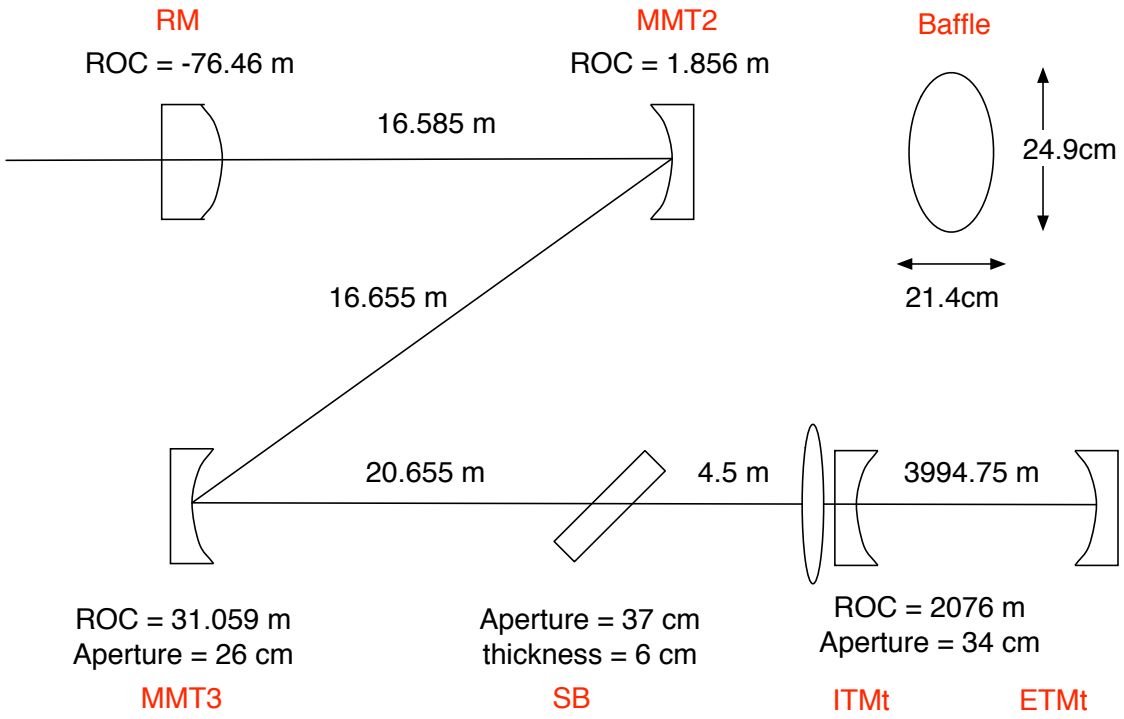
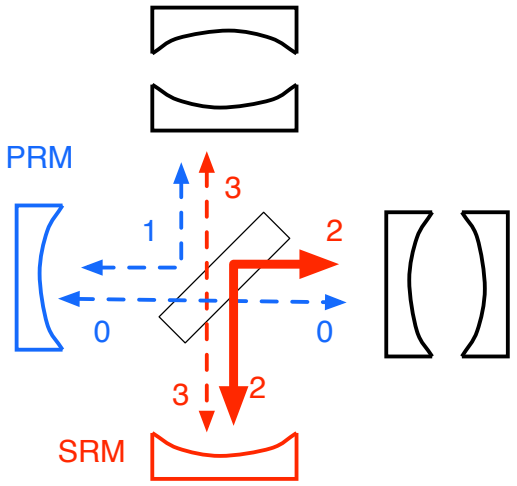
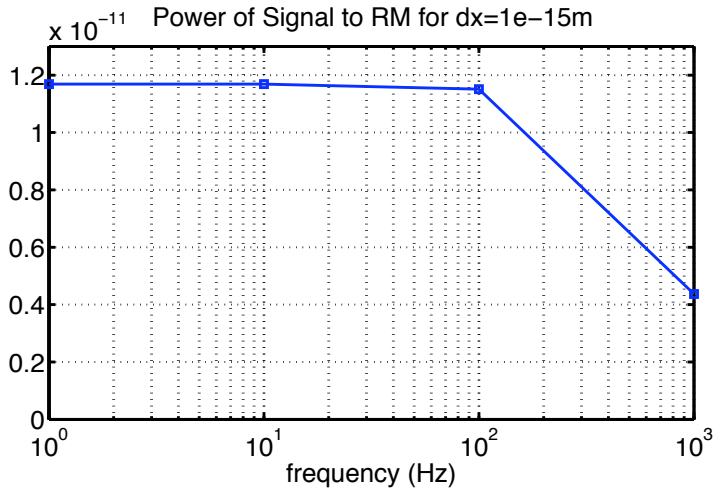


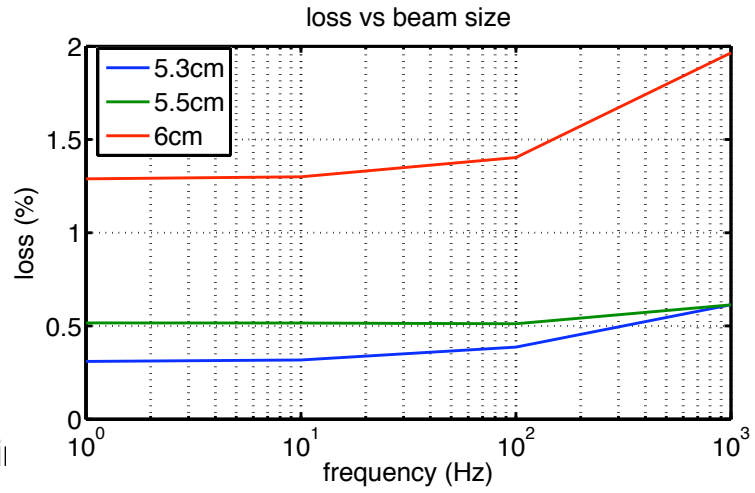


Optic:	Beam Size	PRM	PR2	PR3	SRM	SR2	SR1	ITM	ETM
ROC(m):	5.55 cm	11.37	-1.48	34	-15.0	-3.261	34	1971	2191
ROC (m):	5.31 cm	11.63	-1.491	34	-18.35	-3.258	34	1935	2243
ROC (m):	5.956cm	10.98	-1.451	34	-11.755	-3.256	34	2076	2076

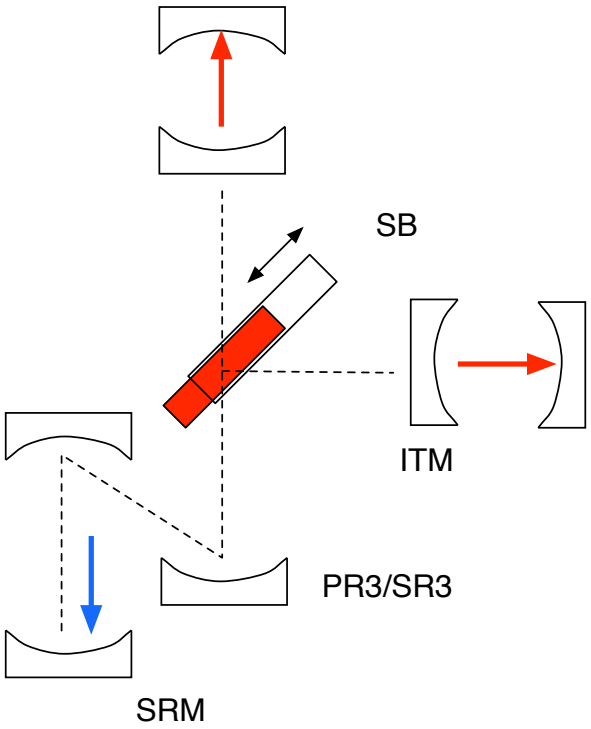
frequency dependence of signal SB Loss on SRM

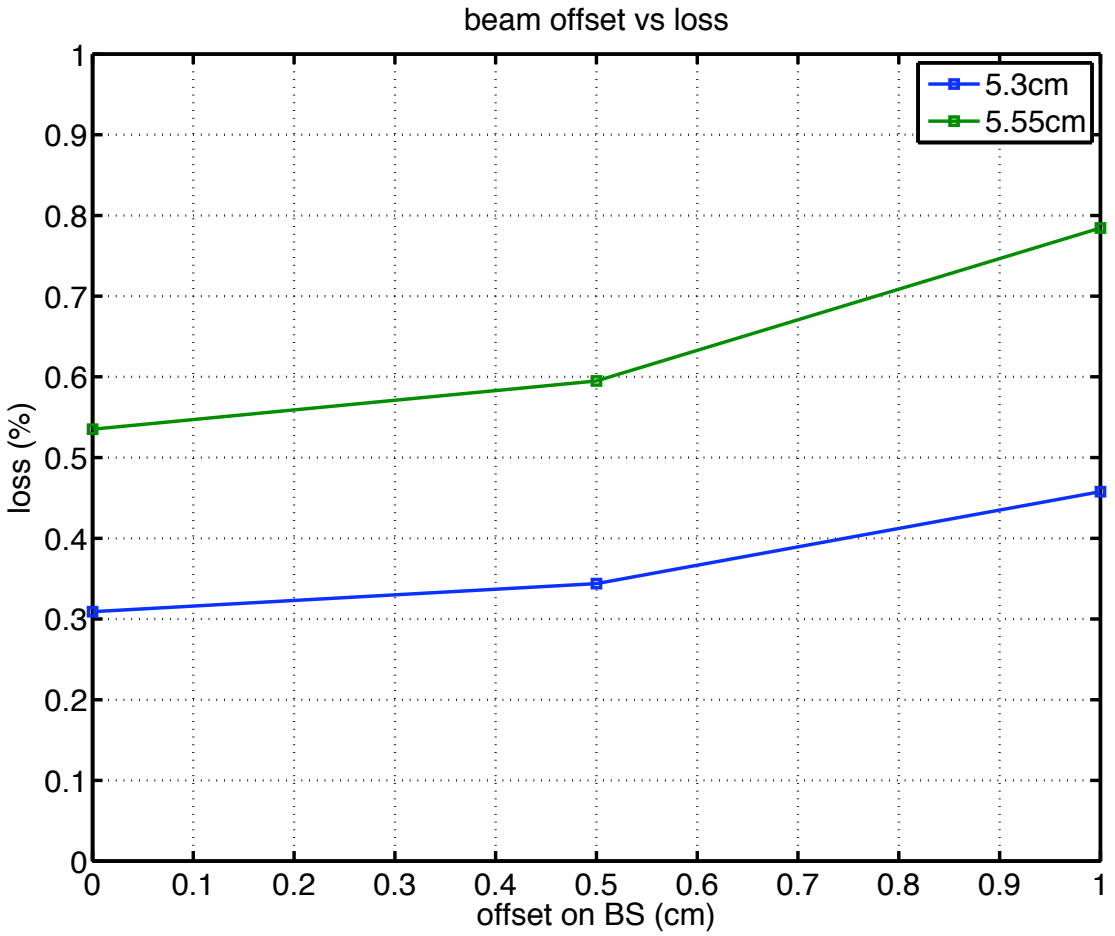
- lock by injecting CR from RM
- add π/4 to Michelson cavity
- shake ETM
- calculate 00 mode to RM
- loss = 1 - E00/E00(max)
- E00(max) : 5.55cm
  ROCs with large optics





beam offset effect on loss

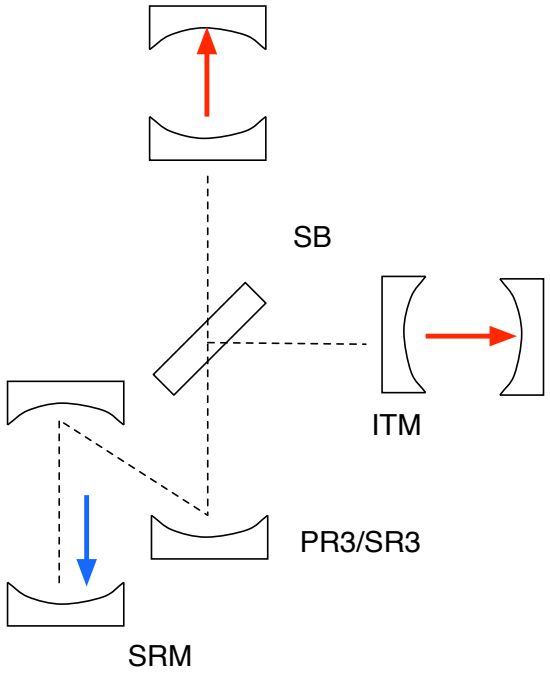




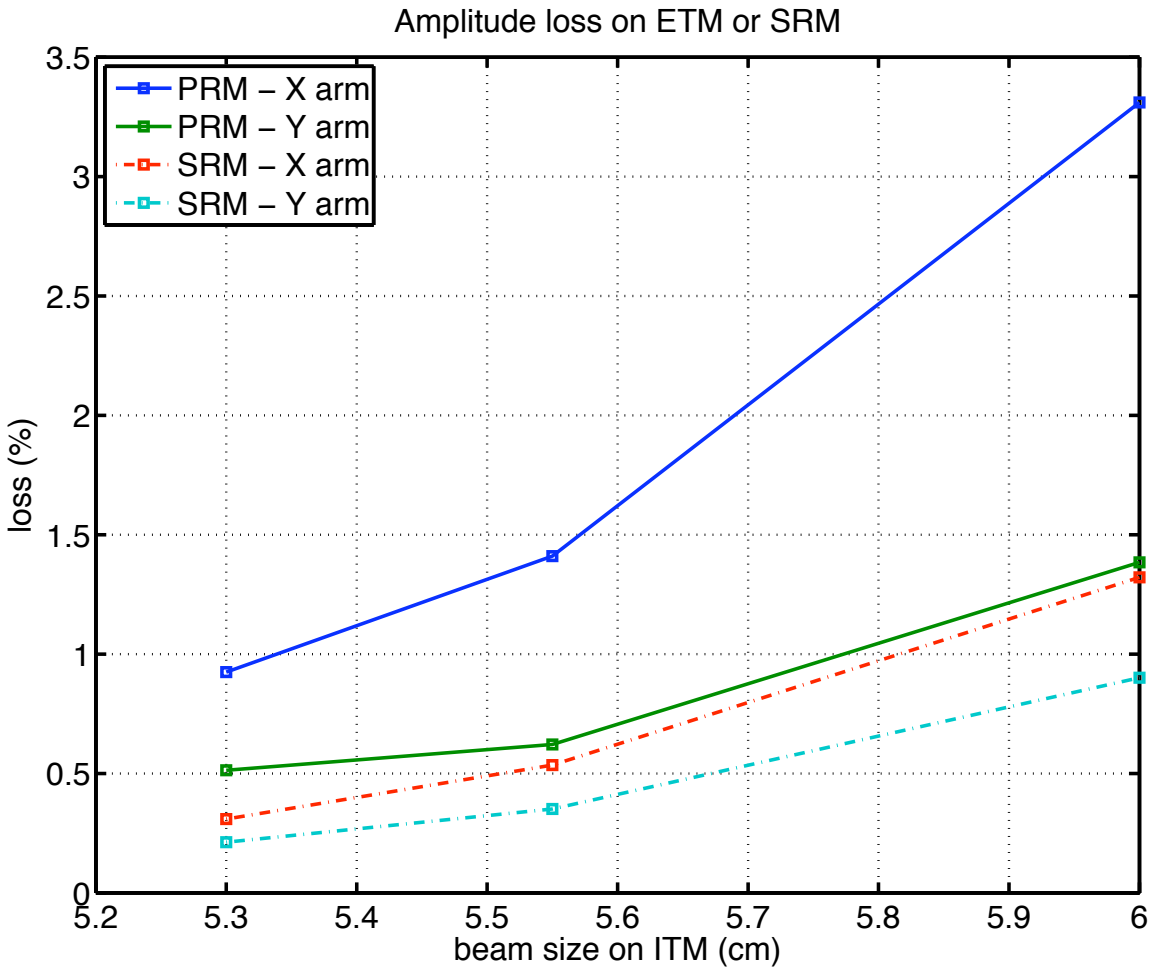
amplitude loss vs beam size

PRM : TEM00 on ETM

SRM : TEM00 on SRM



G0810029-v2



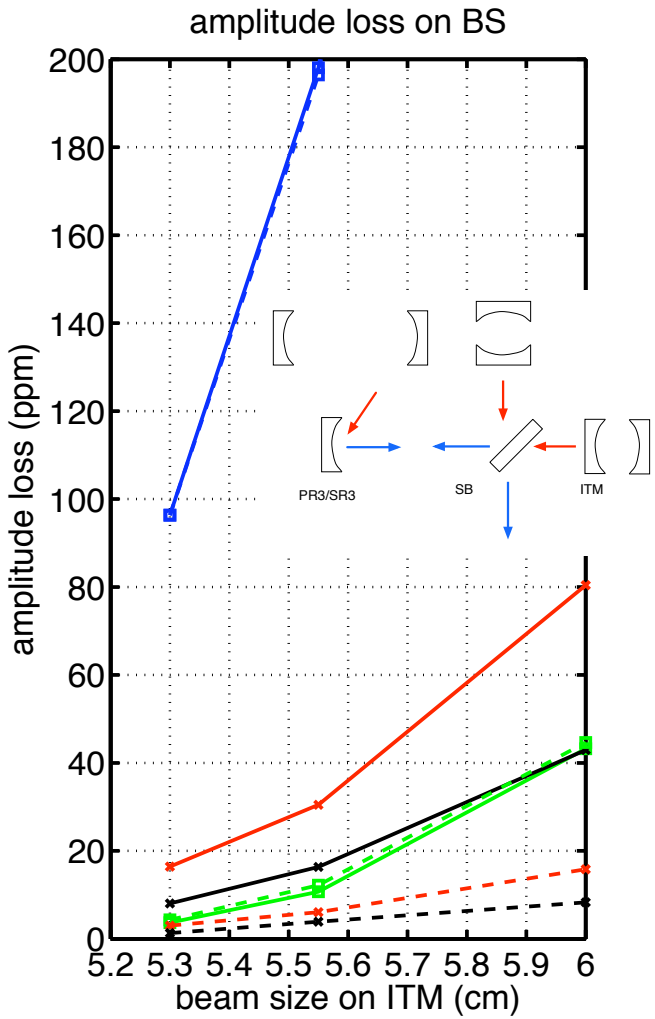
amplitude loss on BS and SR3/PR3

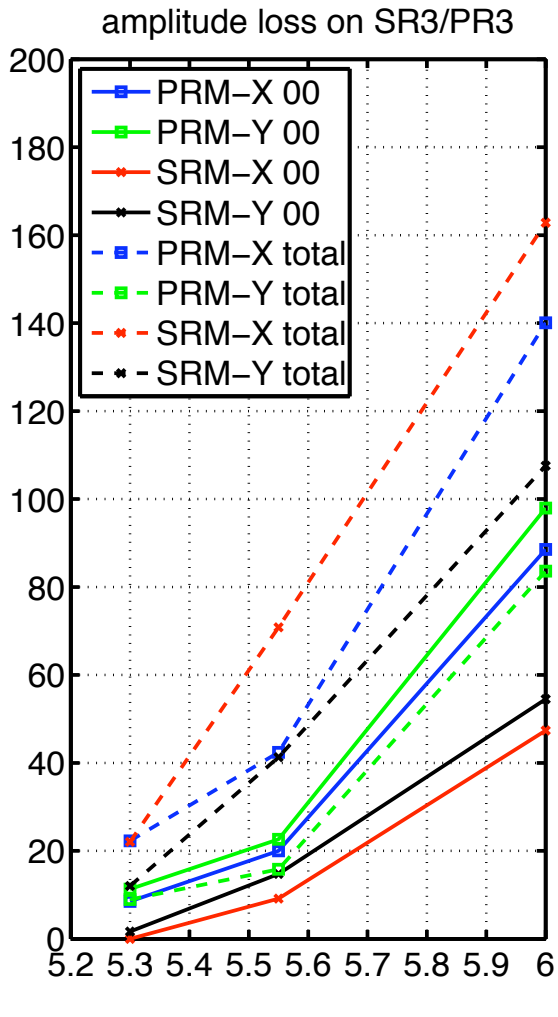
——— 00 mode loss

- - - - - total loss

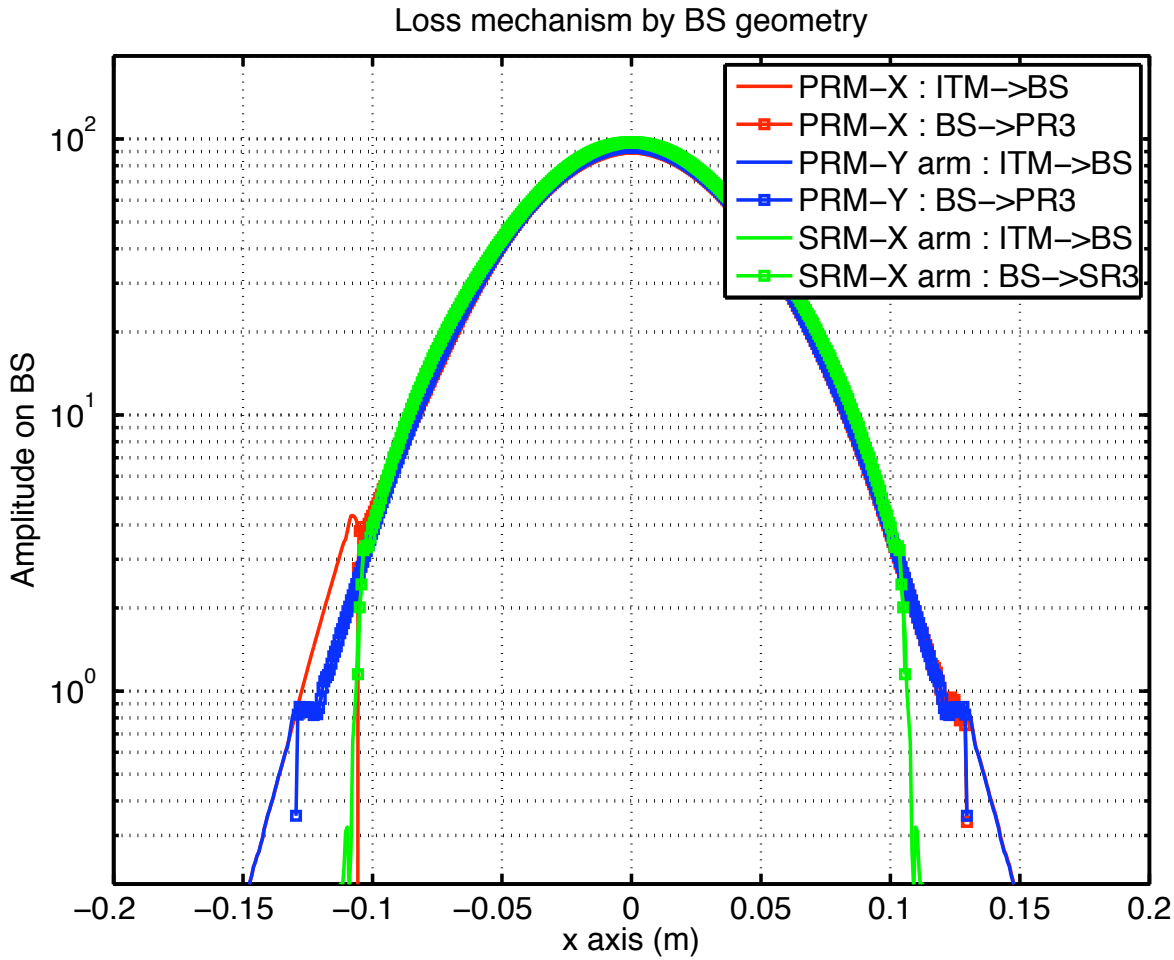
loss(SR3) = 1 - amp(from SR3 to BS) / amp(to SR3 from SR2)

loss(BS) = 1 - amp(from BS to SR3) / amp(to BS from ITM)



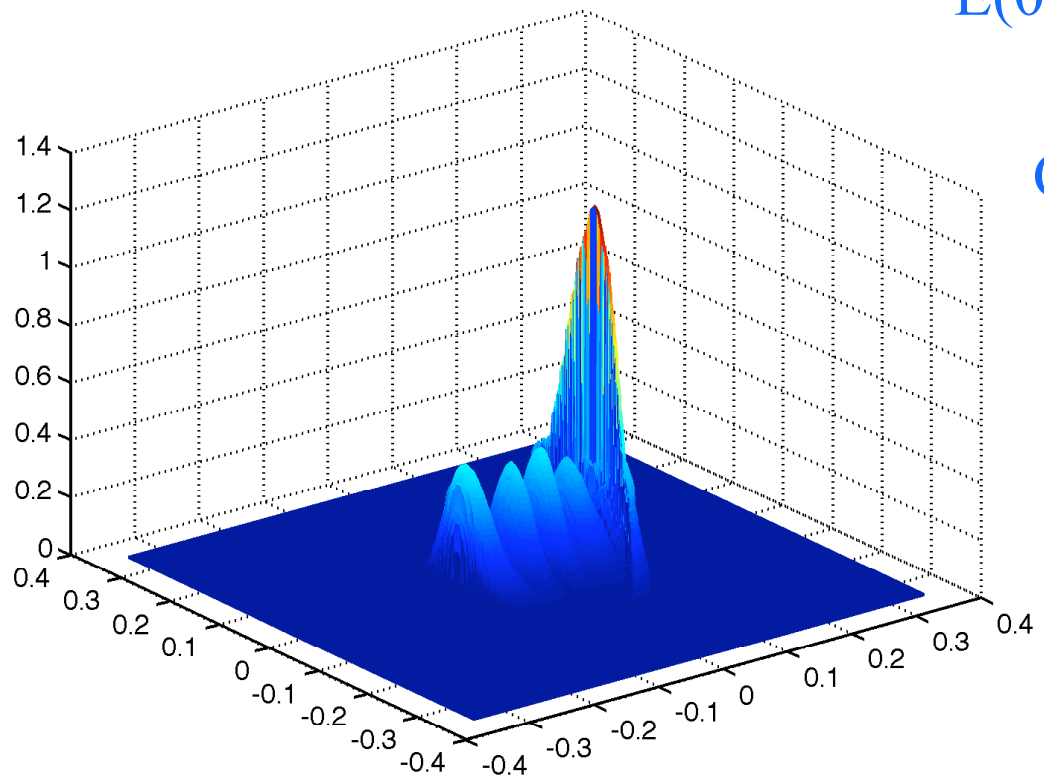


Beam amplitude profile on BS



Contrast Defect

Field on BS toward SRM



$E = E(\text{x-arm}) - E(\text{y-arm}) \exp(i\varphi)$

$E(0,0) = 0$

$$CD = \frac{\text{Power}(E(x) - E(y) \exp(i\varphi))}{\text{Power}(E(x) + E(y) \exp(i\varphi))}$$

CD(5.55cm) = 73ppm

CD(5.30cm) = 36ppm