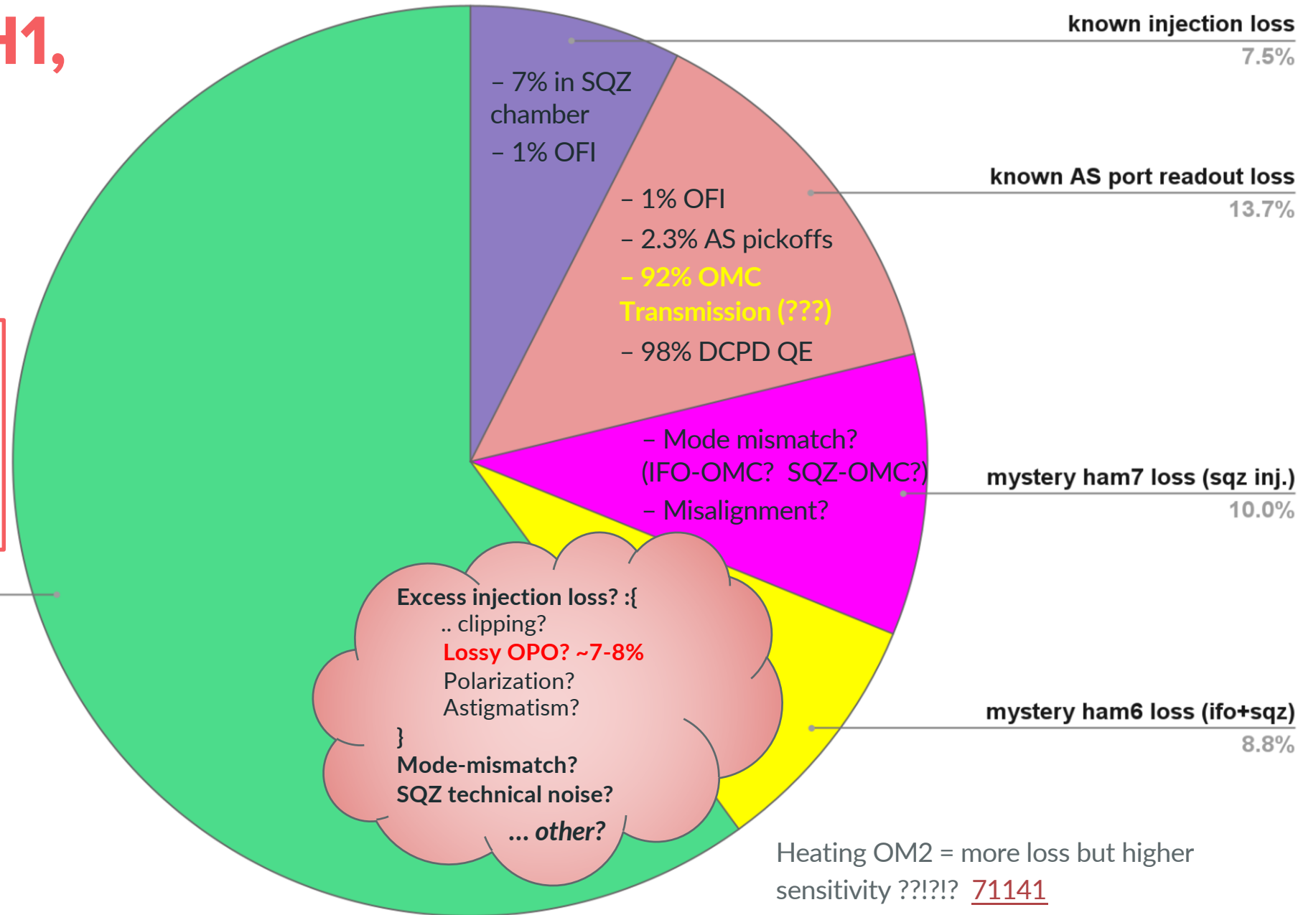


SQZ Losses @ H1, Aug 2023

why only 4 dB?

~35-40% total sqz loss, 0 mrad pn
 ~20% known (→ 6.5 dB)
 ~15-20% mystery (→ 4 dB)
 → w/o sqz, IFO light has
 ~10-15% mystery loss

measured sqz efficiency
 60.0%

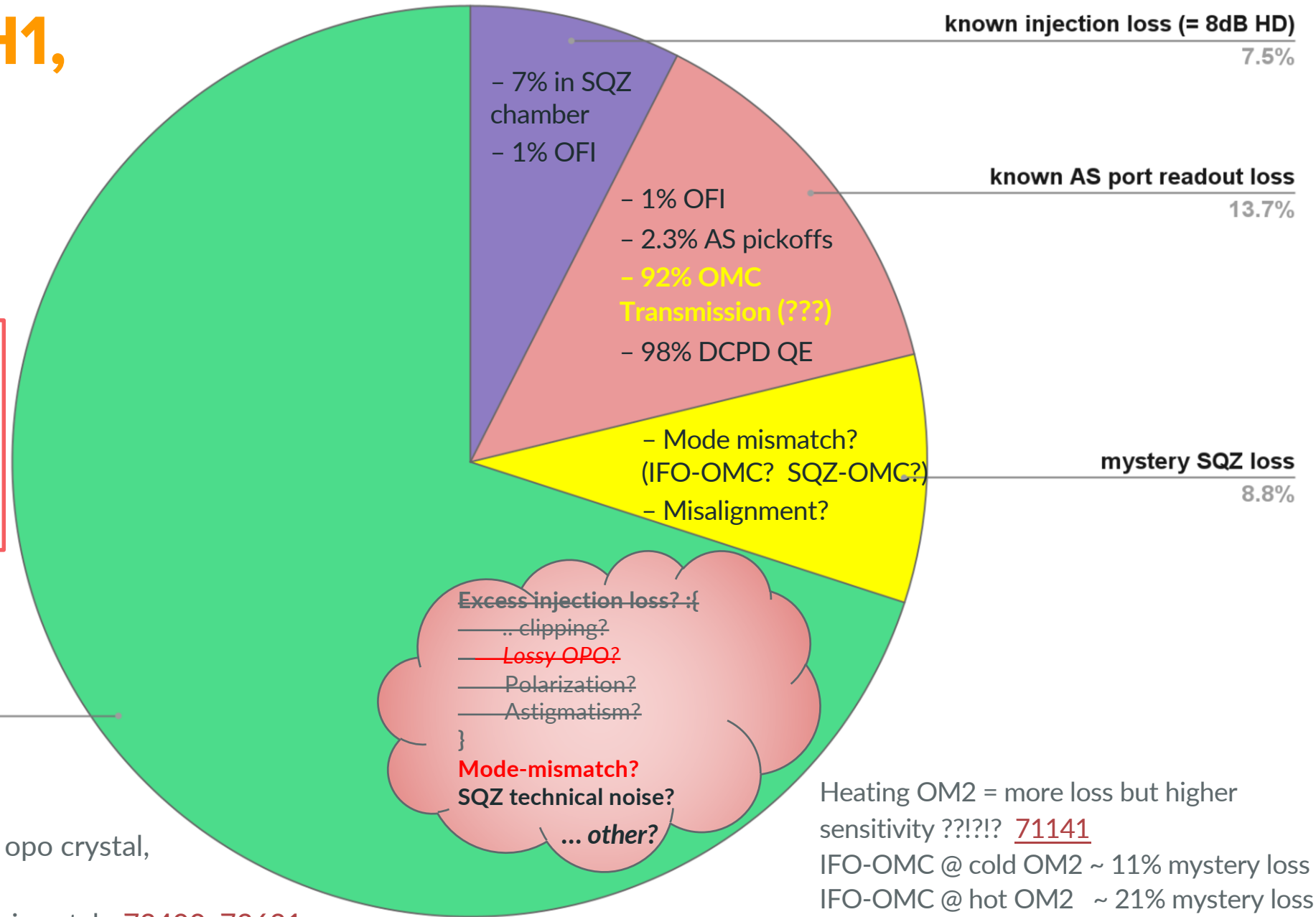


Heating OM2 = more loss but higher sensitivity ?!?!? 71141
 IFO ~11% mystery ham6 loss w/cold OM2
 IFO ~21% mystery ham6 loss w/hot OM2

SQZ Losses @ H1, Nov 2023

why only 5 dB?

~25-30% total sqz loss, 25mrad pn
 ~20% known (→ 6.2 dB)
 ~13% mystery (→ 5 dB)
 → w/o sqz, IFO light has ~10-15% mystery loss



*** Since August:

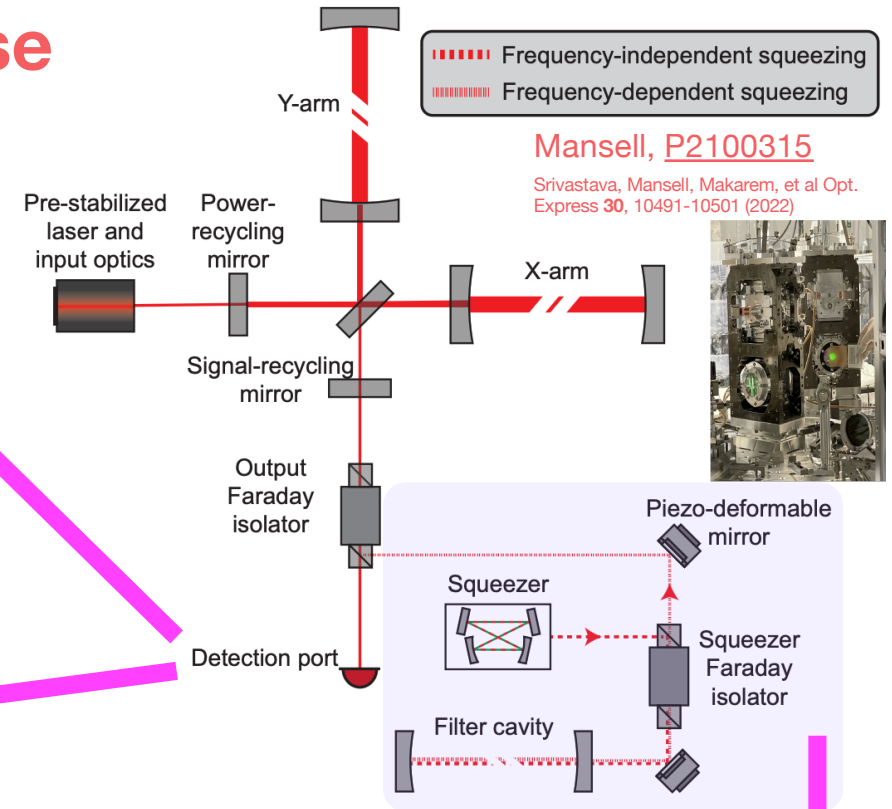
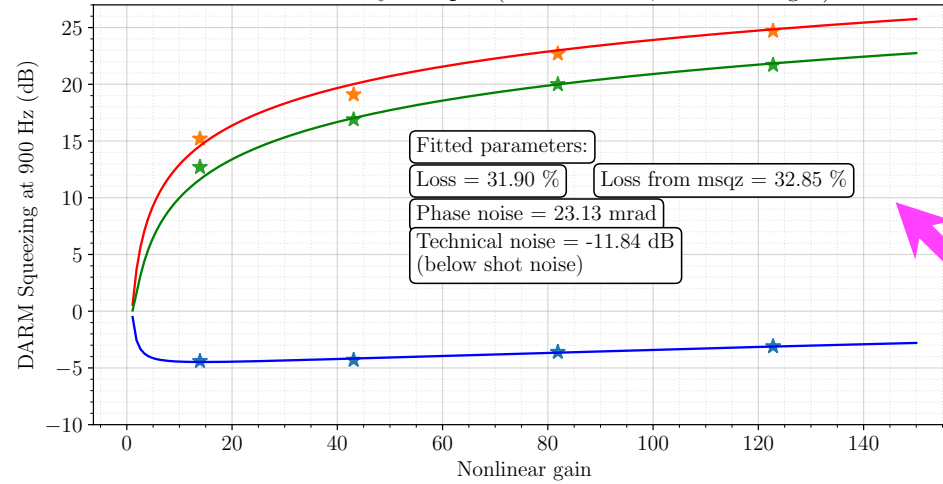
- fixed excess injection losses by moving opo crystal, see 8dB on HD: [73535](#), [73562](#)
- psams sqz data shows freq-dep mode mismatch: [73400](#), [73621](#)
- mode mismatch SQZ-OMC single bounce is ~10% [73696](#)

Heating OM2 = more loss but higher sensitivity ???!?!? [71141](#)
 IFO-OMC @ cold OM2 ~ 11% mystery loss
 IFO-OMC @ hot OM2 ~ 21% mystery loss
 SQZ-OMC @ cold OM2 → 200/200
 SQZ-OMC @ hot OM2 → 120/120

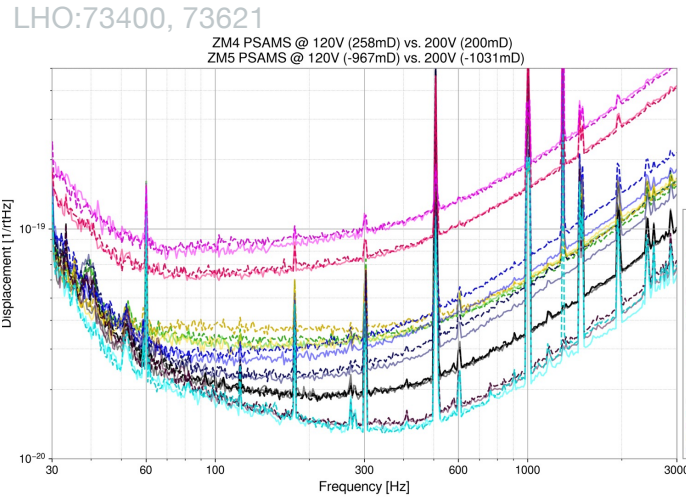
More SQZ?

30% loss, 25 mrad phase noise

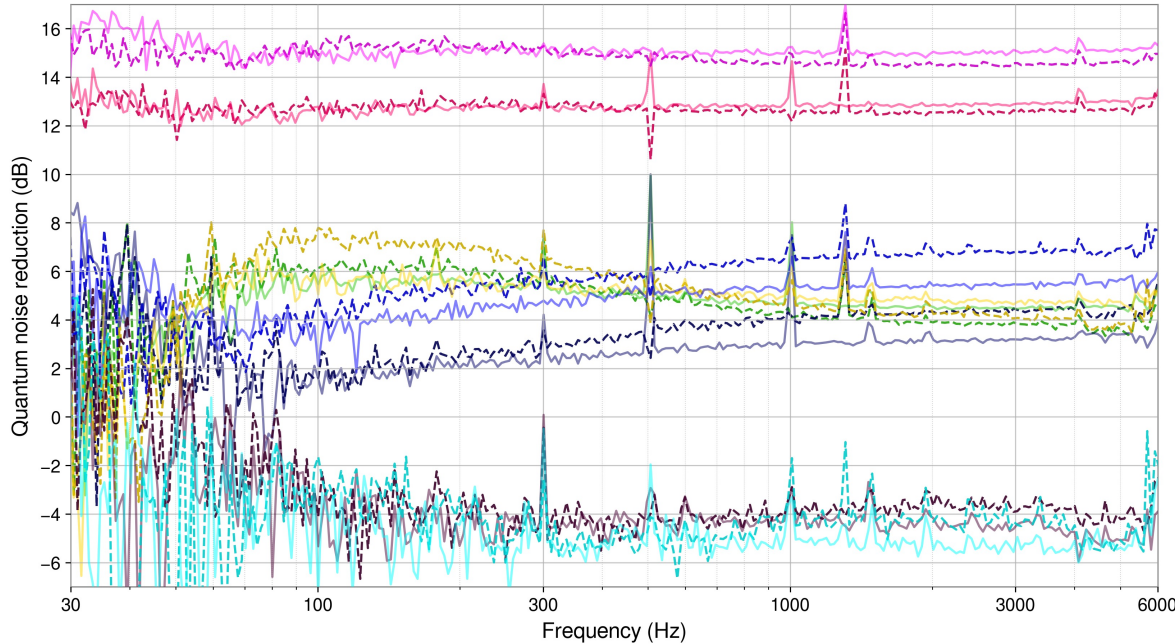
25 Oct. 2023, Non-linear gain sweep on DARM, LHO:73747
Week 1 @ new crystal spot (2nd from left, 5th from right)



Mansell, P2100315
Srivastava, Mansell, Makarem, et al Opt. Express 30, 10491-10501 (2022)

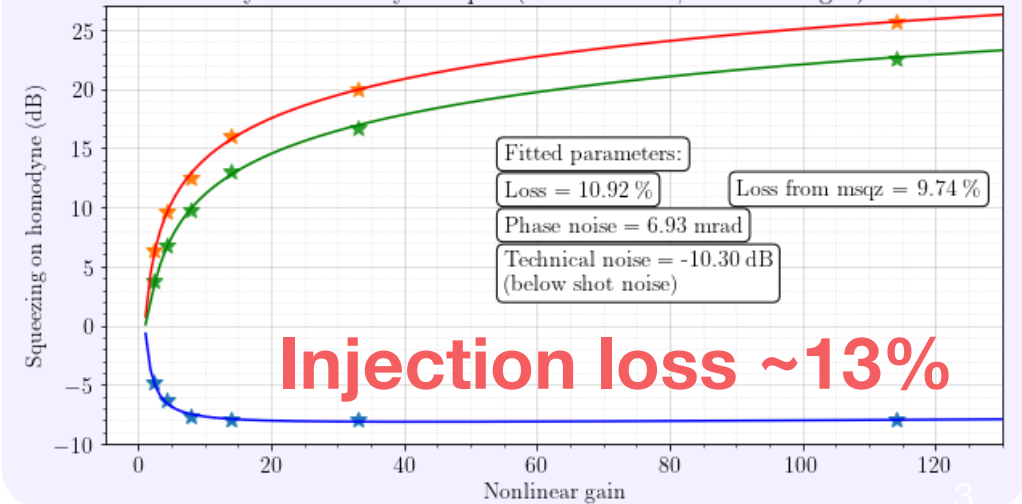


Mode-mismatch



- FDS, $\phi = 9$ deg, 101123_psams120
sn sqz ~ -3.45 dB, fc @ -25 Hz
- FDAS, $\phi = -81$ deg, 101123_psams120
sn sqz ~ 12.54 dB, fc @ -25 Hz
- FDS +mid, $\phi = -13.5$ deg, 101123_psams120
sn sqz ~ 4.04 dB, fc @ -25 Hz
- FDS -mid, $\phi = 29$ deg, 101123_psams120
sn sqz ~ -4.32 dB, fc @ -25 Hz
- FDS, $\phi = 9$ deg, 101123_psams200
sn sqz ~ -4.24 dB, fc @ -25 Hz
- FDAS, $\phi = -81$ deg, 101123_psams200
sn sqz ~ 12.86 dB, fc @ -25 Hz
- FDS +mid, $\phi = -13.5$ deg, 101123_psams200
sn sqz ~ 4.51 dB, fc @ -25 Hz
- FDS -mid, $\phi = 29$ deg, 101123_psams200
sn sqz ~ -3.05 dB, fc @ -25 Hz
- FDS, $\phi = 9$ deg, 102023_psams120
sn sqz ~ -3.84 dB, fc @ -25 Hz
- FDAS, $\phi = -81$ deg, 102023_psams120
sn sqz ~ 14.50 dB, fc @ -25 Hz
- FDS +mid, $\phi = -13.5$ deg, 102023_psams120
sn sqz ~ 4.22 dB, fc @ -25 Hz
- FDS -mid, $\phi = 29$ deg, 102023_psams120
sn sqz ~ -6.69 dB, fc @ -25 Hz
- FDS, $\phi = 9$ deg, 102023_psams200
sn sqz ~ -4.57 dB, fc @ -25 Hz
- FDAS, $\phi = -81$ deg, 102023_psams200
sn sqz ~ 15.07 dB, fc @ -25 Hz
- FDS +mid, $\phi = -13.5$ deg, 102023_psams200
sn sqz ~ 4.83 dB, fc @ -25 Hz
- FDS -mid, $\phi = 29$ deg, 102023_psams200
sn sqz ~ 5.30 dB, fc @ -25 Hz

18 Oct. 2023, Non-linear gain sweep on the homodyne, LHO:73562
Day 1 @ new crystal spot (2nd from left, 5th from right)



Injection loss ~13%