PSL review
Mach-Zehnder modulation

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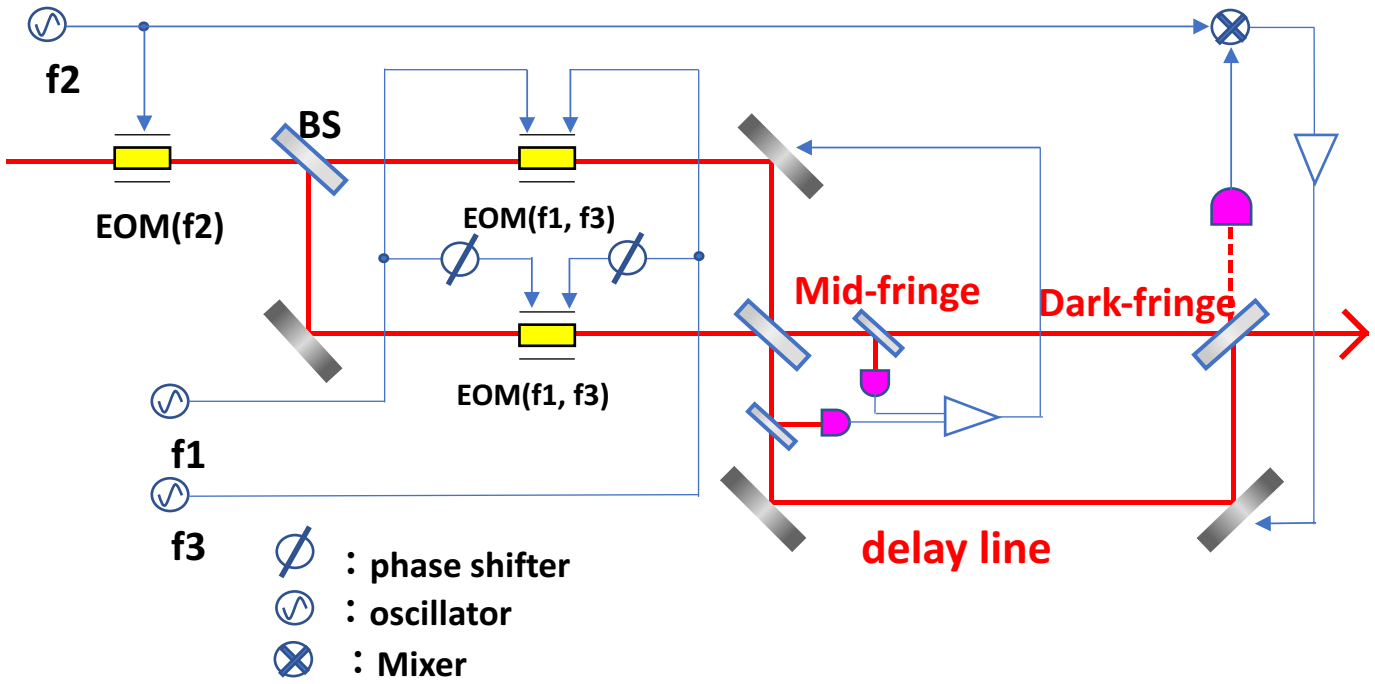
2018.05.31

Configuration and why needed



	frequency [MHz]	modulation type	Signal extraction
f1	16.88	PM & AM	MICH & SRCL
f2	45.02	PM	PRCL
f3	56.27	AM	Local oscillator for center

Why we use this?

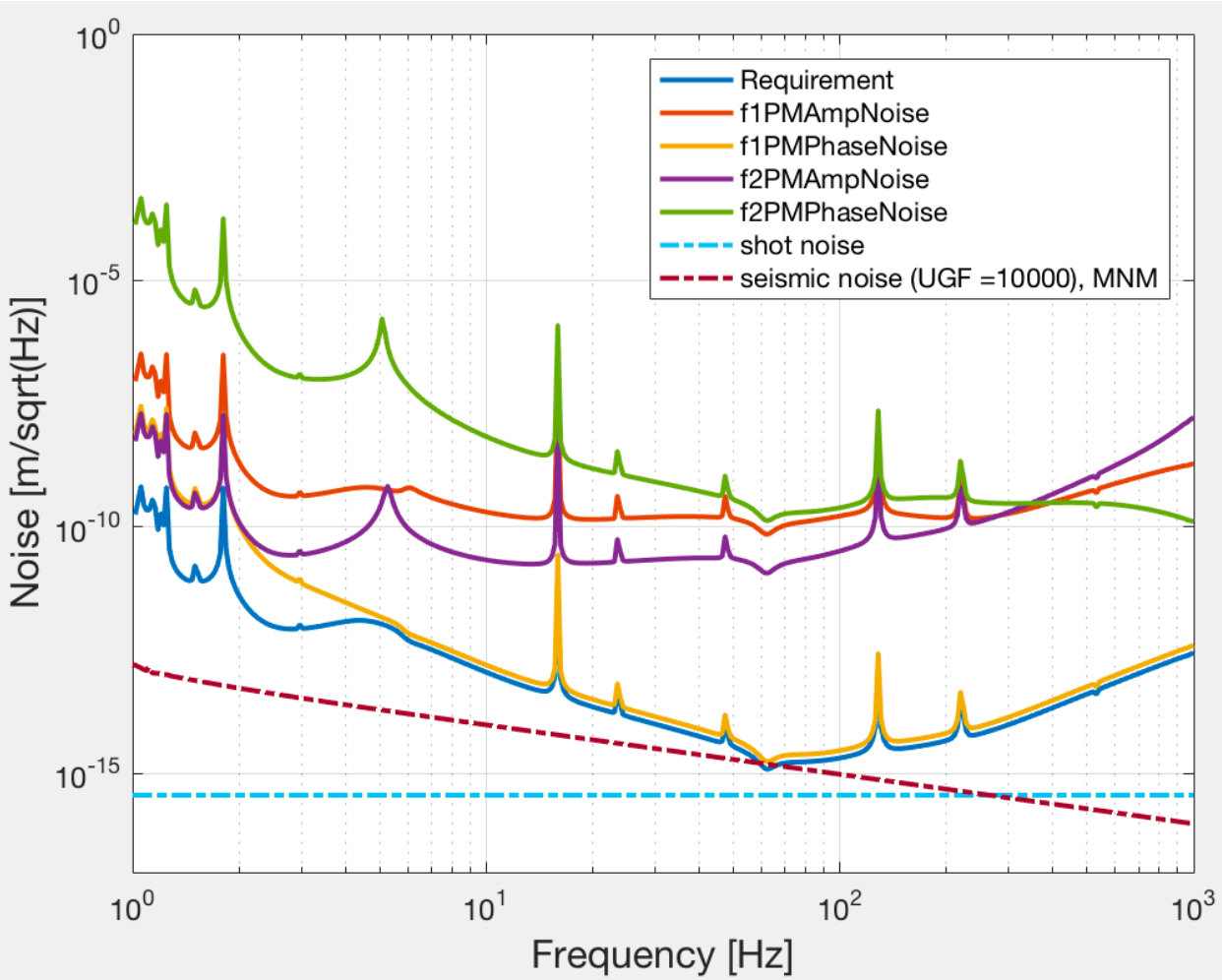
1. Get the signal of the center region independently from that of the arm region

2. Relax the noise requirement for the DRSE[1]

[1]S.Ueda et al., Class. Quantum Grav. 31 (2014) 095003

Simulation

Displacement noise requirement for mid-fringe, DRSE



The variety of laser noise caused by MZI

frequency × modulation type × noise type

(f1, f2) (AM, PM) (Amplitude, Phase)

➢This is feasible in terms of the shot noise (supposed 10[mW] on PD here)

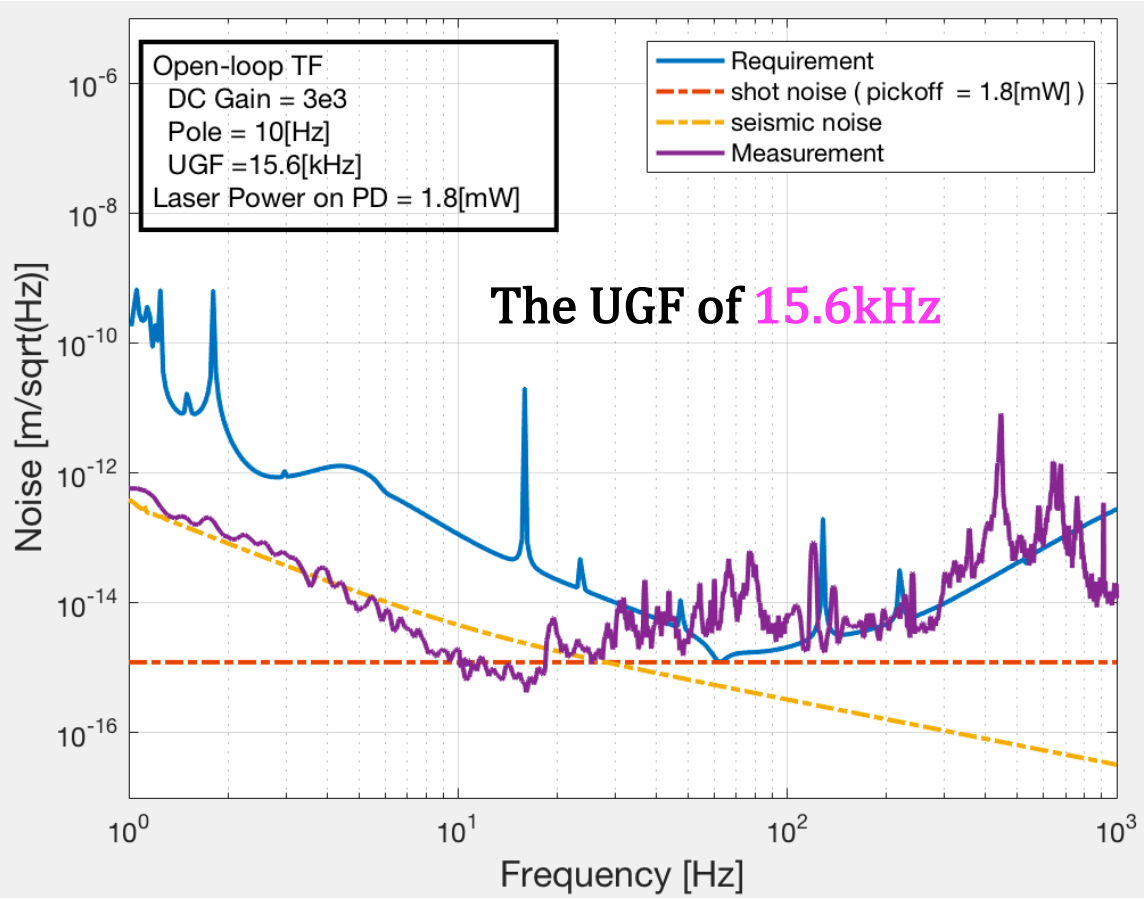
➢ It is phase noise of f1 PM which set the requirement on the displacement noise of mid-fringe.

➢ In order to suppress the seismic noise under the requirement, high UGF seems necessary like 10[kHz].

Experiment

*Laser Power Measurement is not precise. Shot noise is put as reference.

PZT test with simple MZI



experiment condition
- ➢ Filter : SR560
  DC gain = 2e4
  pole = 10 [Hz]
- ➢ Optical component
  PZT : PA44LEW (thorlabs)
  *PZT mirror : HYD-05 (AUTEX)
- ➢ Laser Power on PD
  ~ 1.8 [mW]
  *Half-inch mirror

With the higher power, I think we can meet the requirement with this PZT and mirror.

The future experiment on the main path

- Wait for the completion of PMC installation?
  (the schedule is tight)
- Bypass?
  (calculation of mode match and add other optics, e.g. flip mounts)