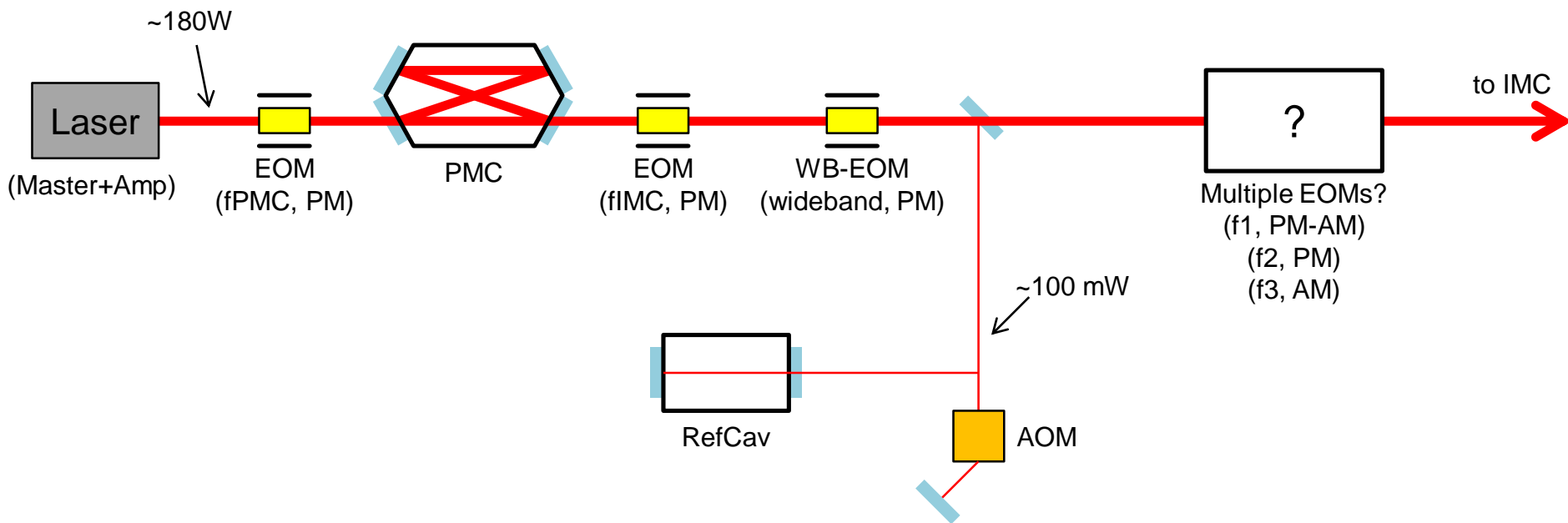# bKAGRA PSL EOM Layout

- Modulation frequencies and requirements for modulations
  JGWwiki/MIFIOOInterfaces
- Abbreviations
  EOM: electro-optic modulator
  PM: phase modulation
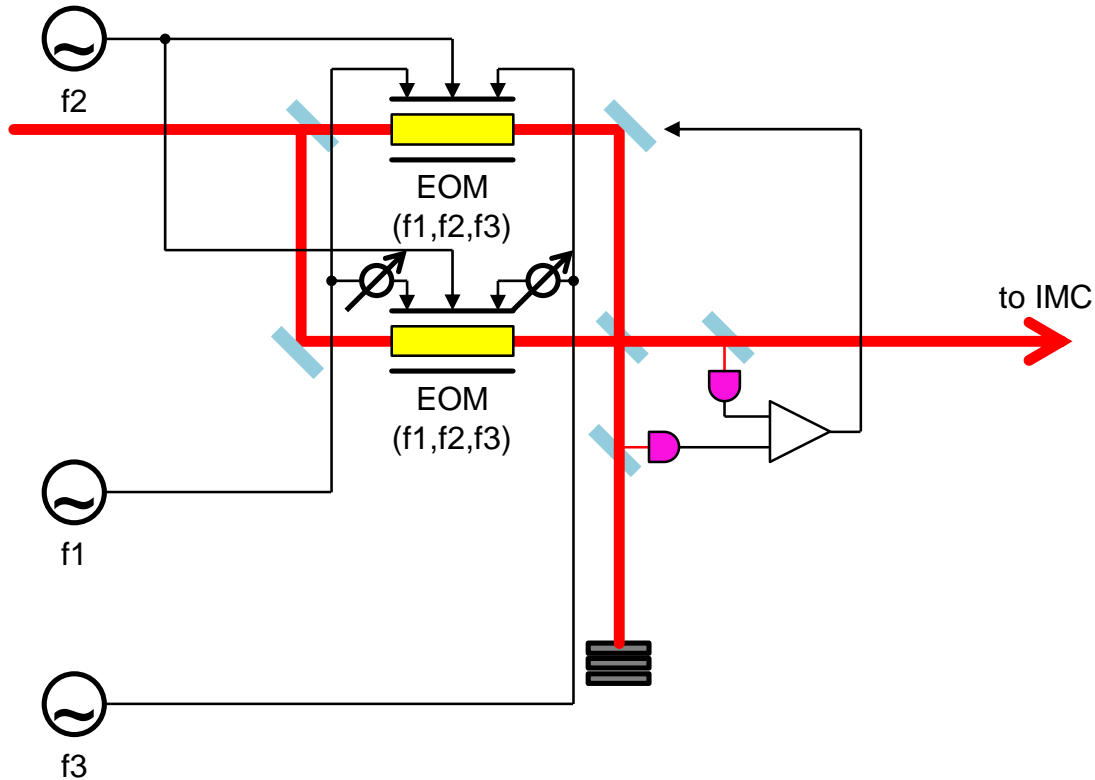 AM: amplitude modulation
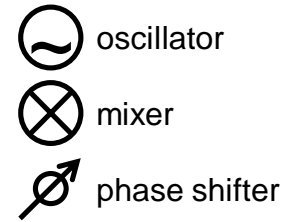 WB: wideband

Requirements for f1, f2, f3

- f1 PM and AM (ratio should be adjusted with respect to detuning)

- f2 PM only

- f3 AM only (turned off once the IFO is locked)

- Series modulation is OK

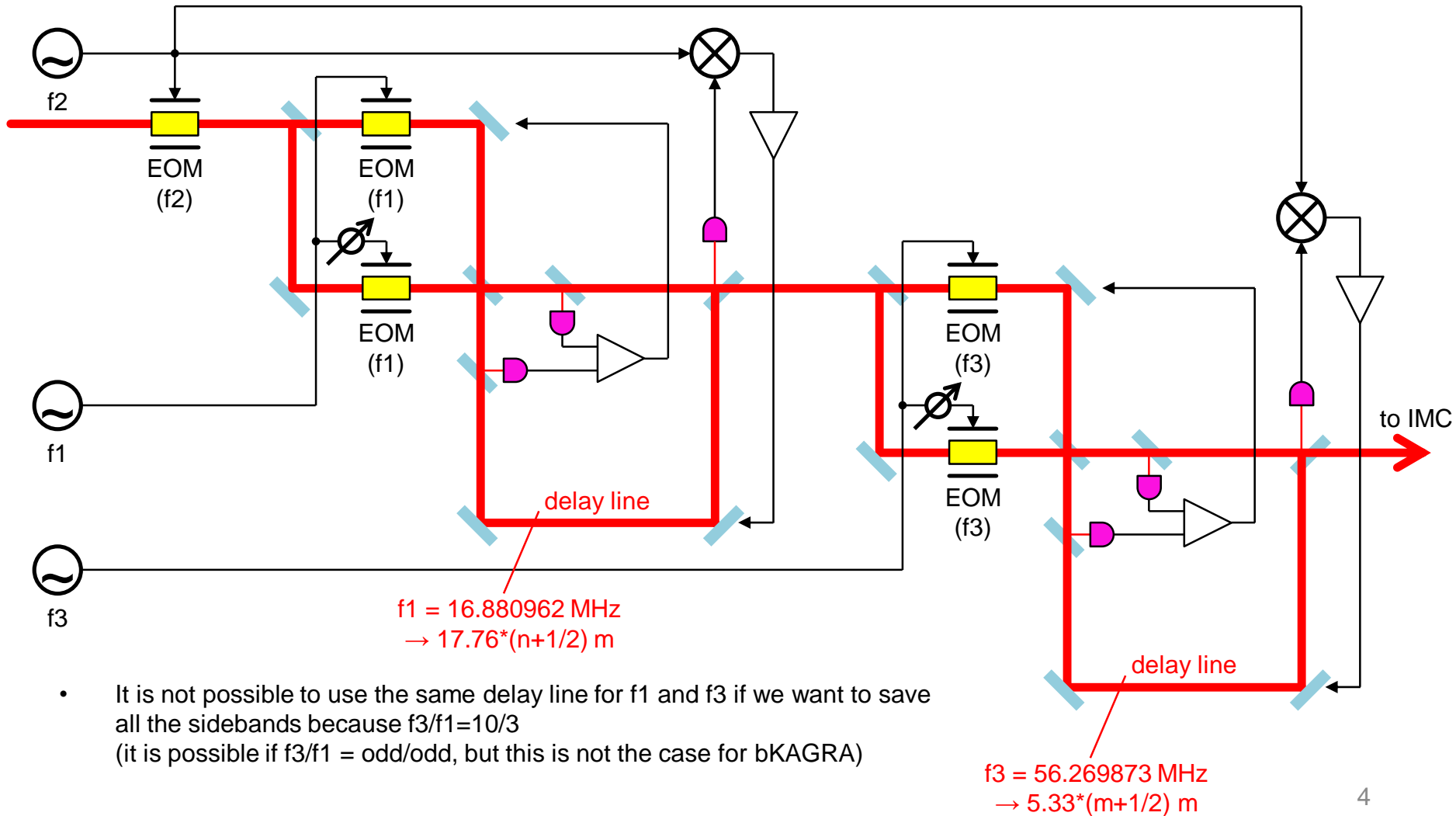- Detailed requirements are summarized in JGWwiki/MIFIOOInterfaces

Layout 1

- Simple but lose half the power

Layout 2

- Saves the whole power

oscillator

mixer

phase shifter

EOM (f2)

EOM (f1)

EOM (f1)

EOM (f3)

EOM (f3)

delay line

f1 = 16.880962 MHz
→ 17.76*(n+1/2) m

delay line

f3 = 56.269873 MHz
→ 5.33*(m+1/2) m

to IMC

f1

f2

f3

- It is not possible to use the same delay line for f1 and f3 if we want to save all the sidebands because f3/f1=10/3
  (it is possible if f3/f1 = odd/odd, but this is not the case for bKAGRA)

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Layout 3

- Simpler, but loses some f3 AM

oscillator

mixer

phase shifter

EOM (f2)

EOM (f1,f3)

EOM (f1,f3)

f2

f1

f3

delay line

f1 = 16.880962 MHz
→ 17.76*1/2 = 8.88 m