

# Frequency noise from alignment fluctuation

Yuta Michimura

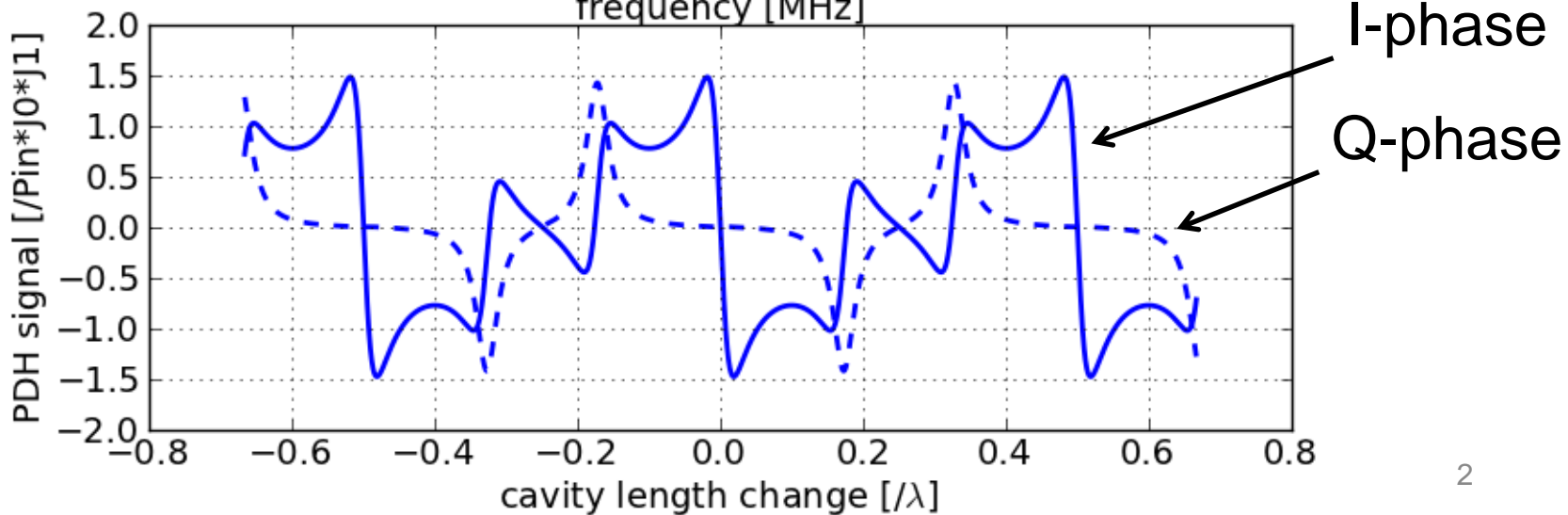
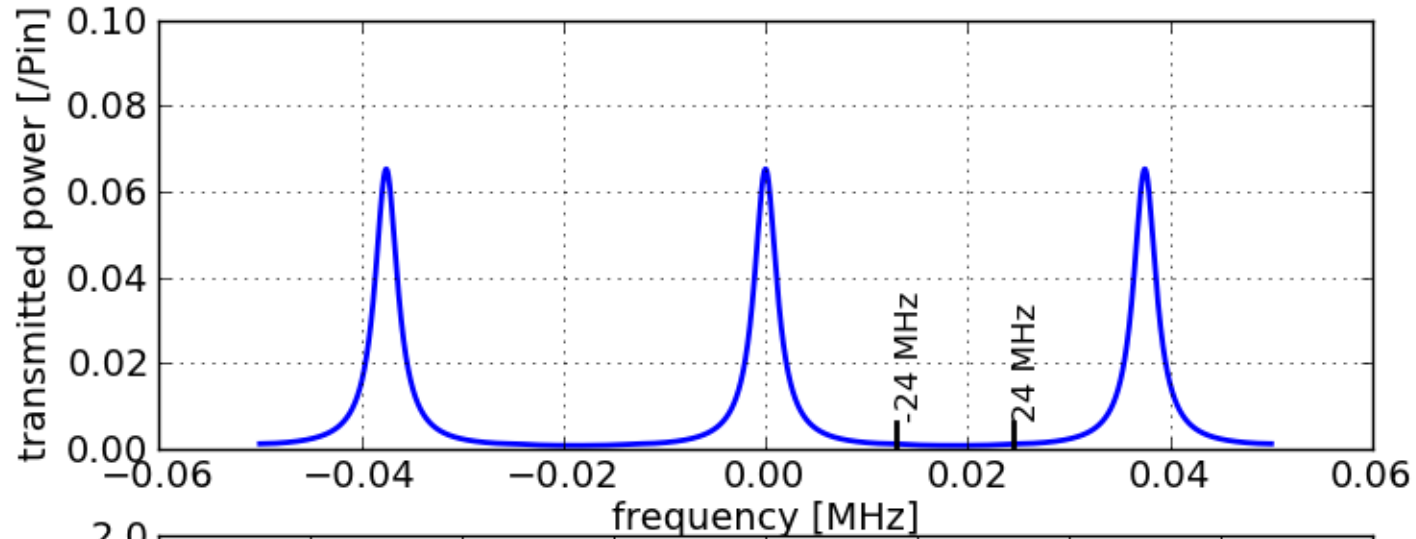
Ando Group

Department of Physics, University of Tokyo

For details, see [LHO alog #9429](#)

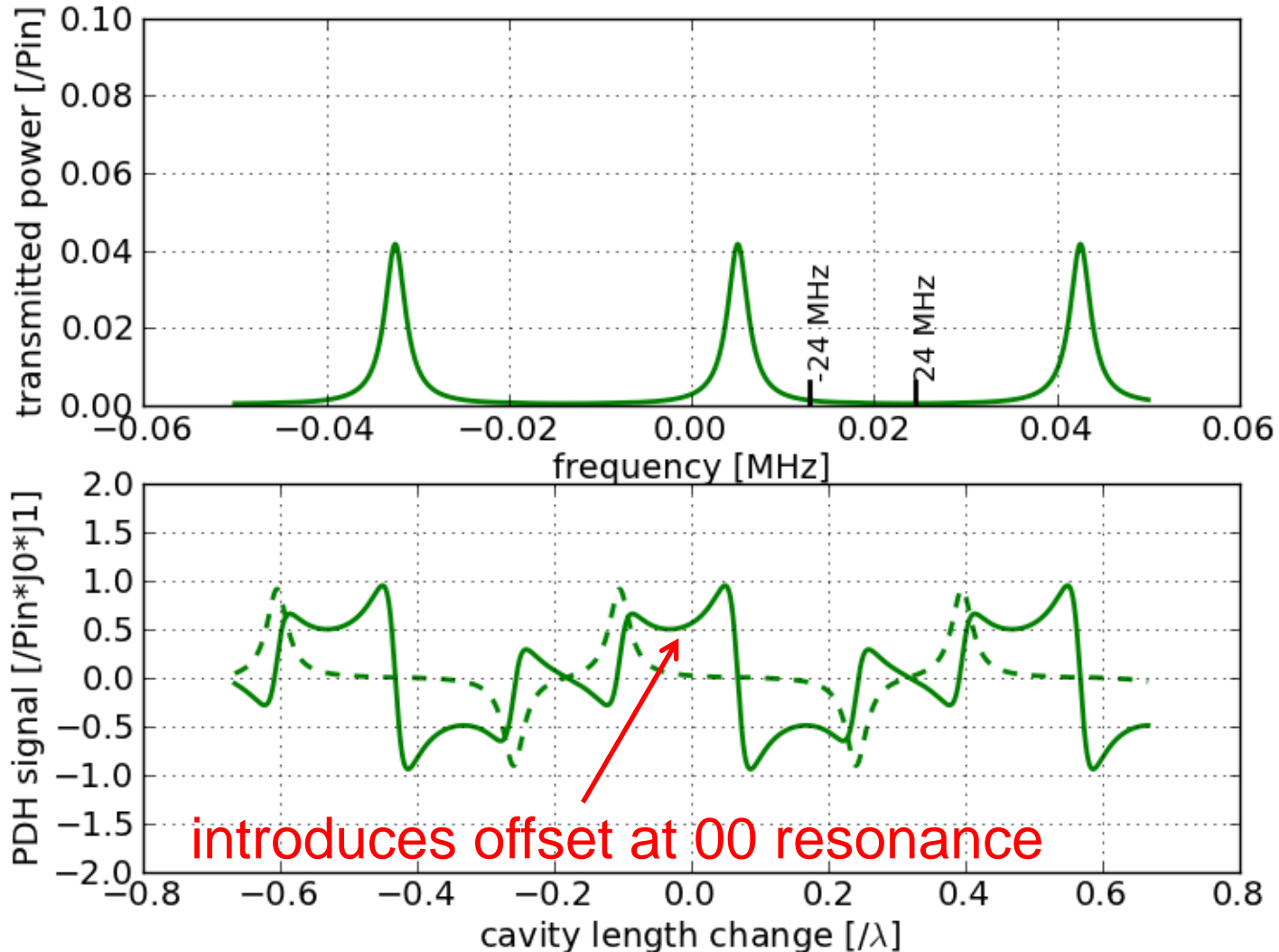
# PDH signal from 00 mode

- zero crossing at 00 resonance



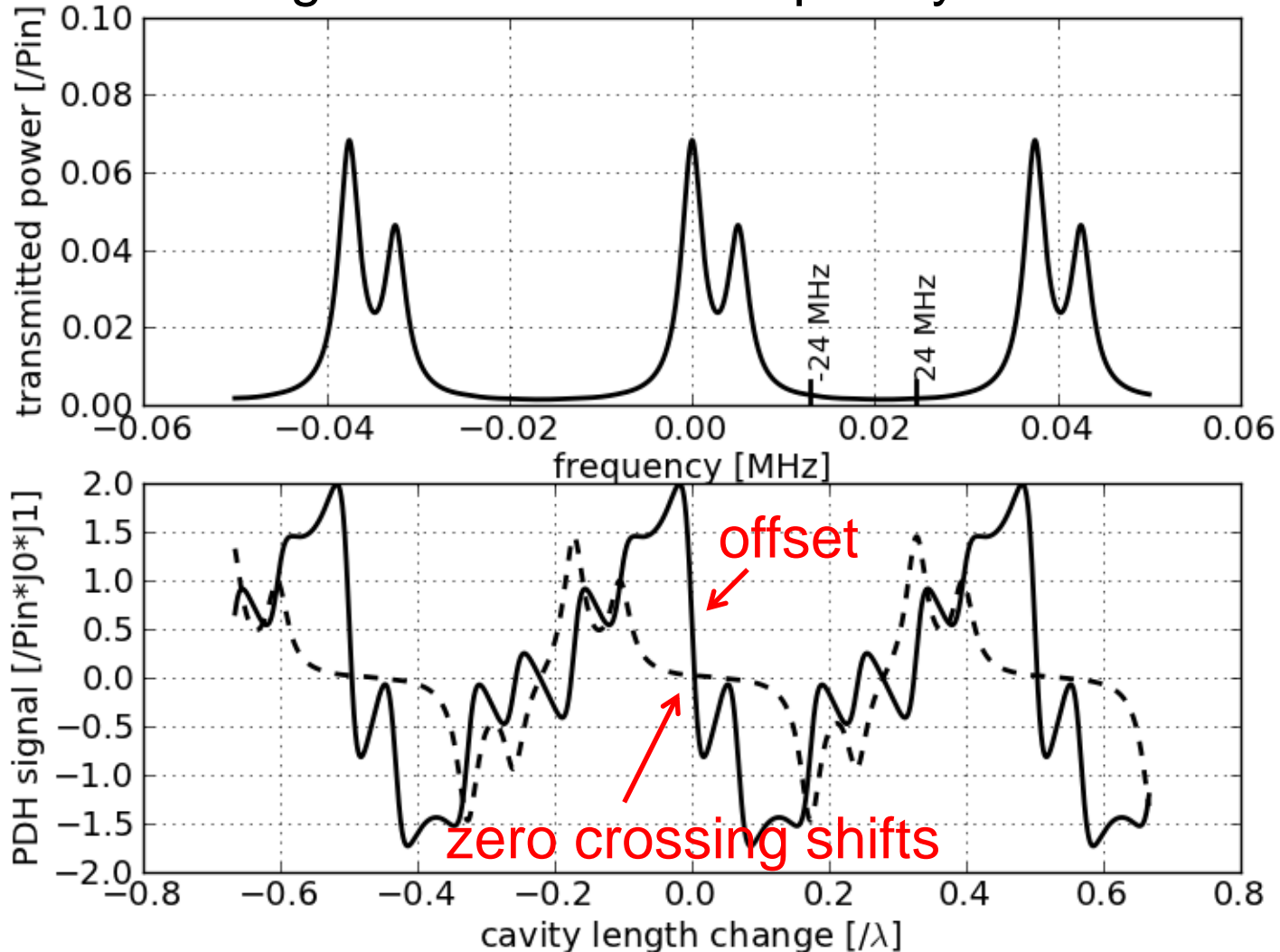
# PDH signal from 10/01 mode

- 10/01 mode from misalignment introduces offset at 00 resonance



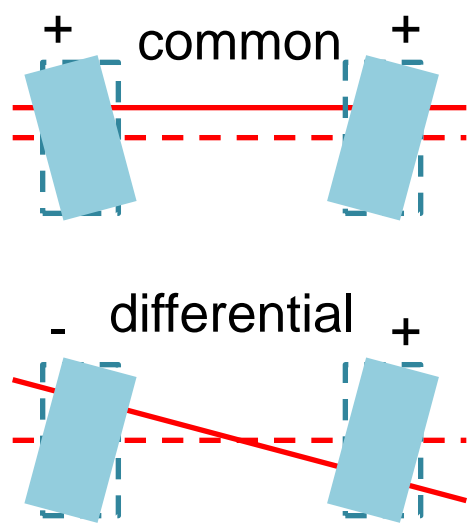
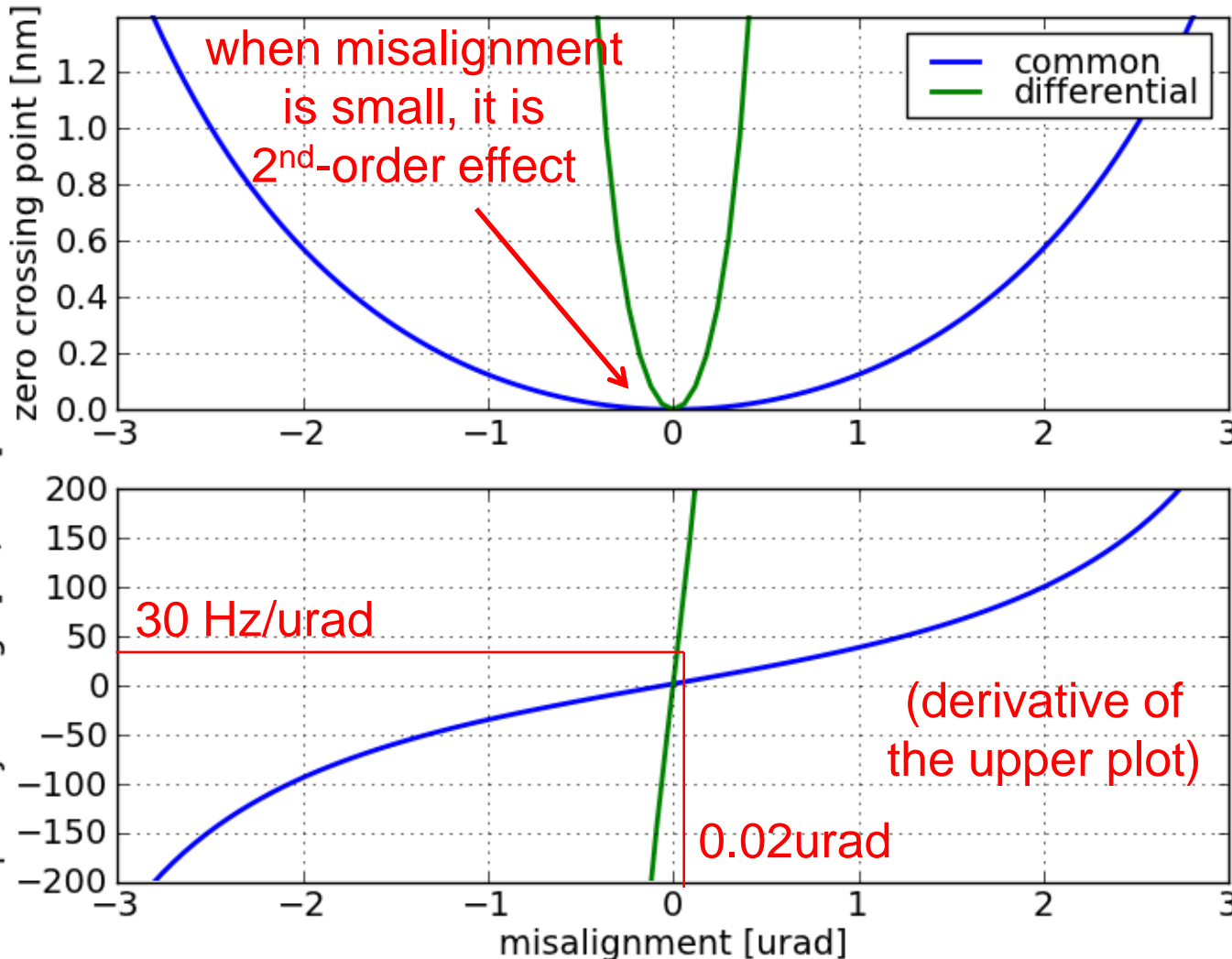
# PDH signal combined

- misalignment shifts zero crossing point (locking point)  
→ misalignment creates frequency noise



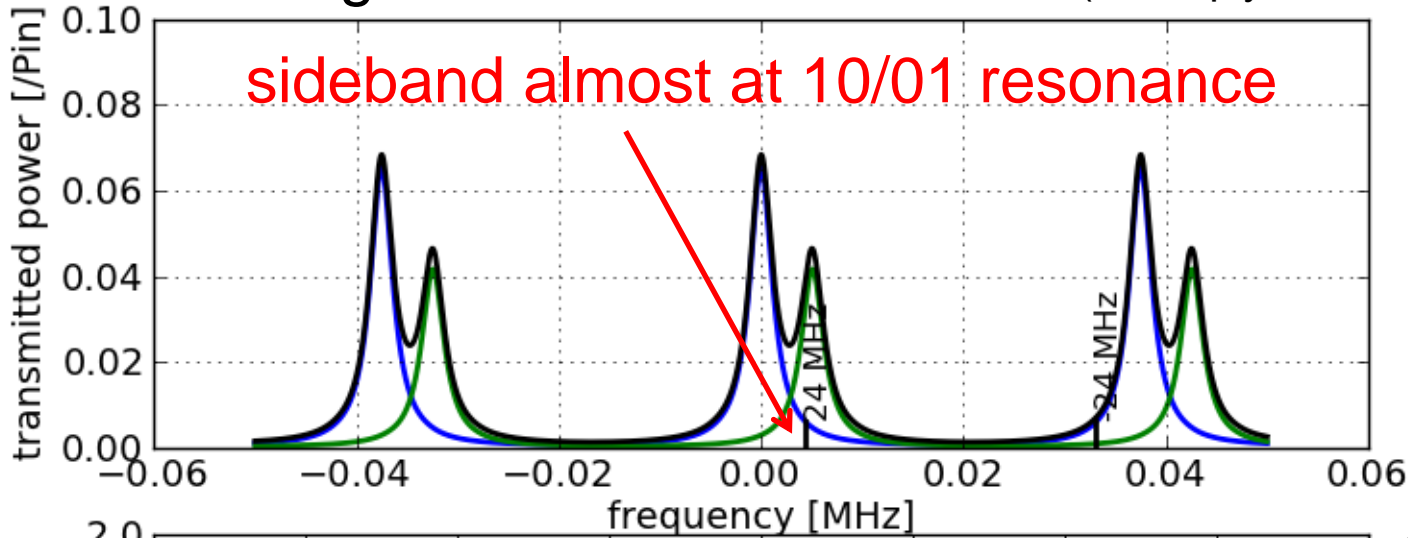
# Zero crossing point shift

- if misalignment is  $< \sim 0.02$  urad,  
freq noise / misalignment fluctuation  $< 30\text{Hz/urad}$



# Solutions?

- tune sideband frequency to locate zero crossing of 10/01 PDH signal at 00 resonance (or simply make high finesse cavity.....)



sideband frequency  
24.407079 MHz  
↓  
24.424479 MHz

