

A photograph of a round cake with white frosting, decorated with a sprig of rosemary, several red berries, and a dark chocolate plaque. The plaque has the text 'CAFFETTERIA il Distrot. FOOD & DRINKS' on it. The cake is on a white rectangular plate, which is decorated with a drizzle of red sauce. The background is a dark, textured surface.

Reports on KIW5

Satoru Takano

Feb. 22 2019 Ando Lab Seminar

Timeline

2/12	Haneda → Frankfurt → München → Pisa	Departure
2/13	Pisa → Perugia	Virgo site tour
2/14	Perugia	KIW5 day1
2/15		KIW5 day2
2/16		KV3GW My Presentation
2/17	Perugia → Roma → Frankfurt → Haneda	Return

Virgo site tour

- Yokozawa-san planned Virgo site tour
- Member:
 - ▶ Yokozawa-san
 - ▶ Yamamoto-san
 - ▶ Yuzurihara-san
 - ▶ me
 - ▶ Kozu-kun
 - ▶ Fukunaga-kun
- It happened that Izumi-san was there (to help commissioning?)
- I don't want to talk about Virgo in detail because some of you may know it much more than me ...

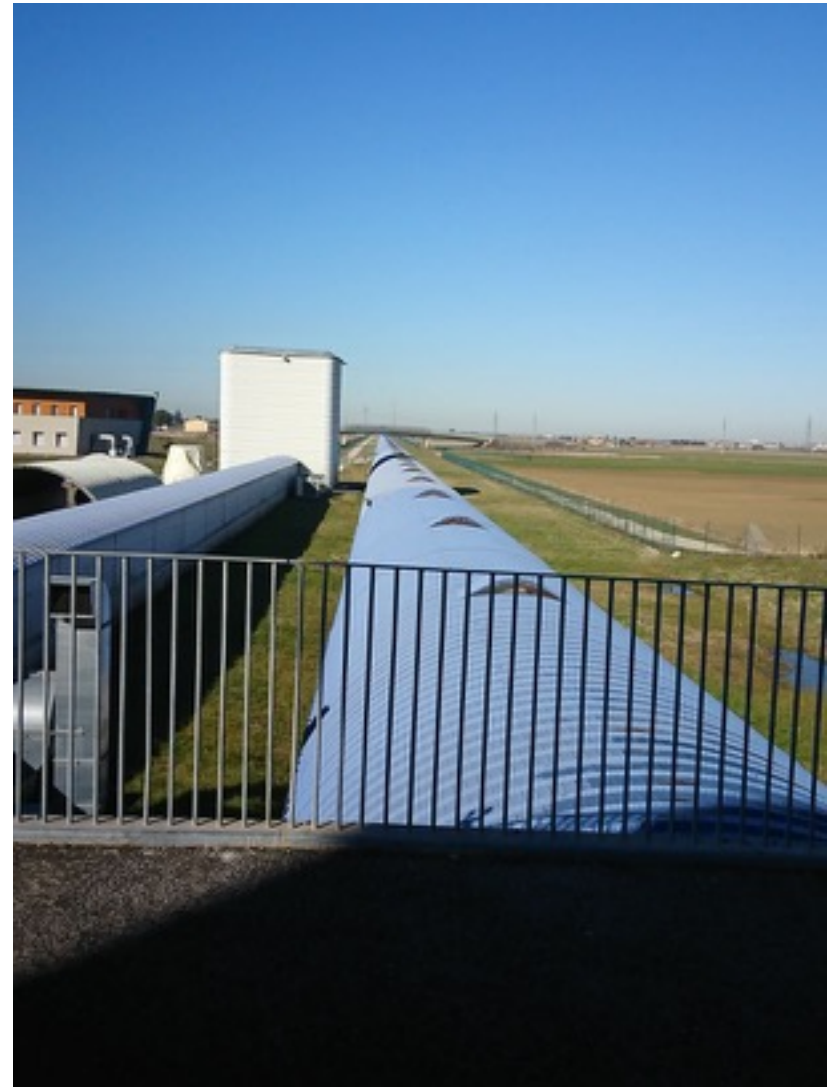


Photos



↑ NW arm

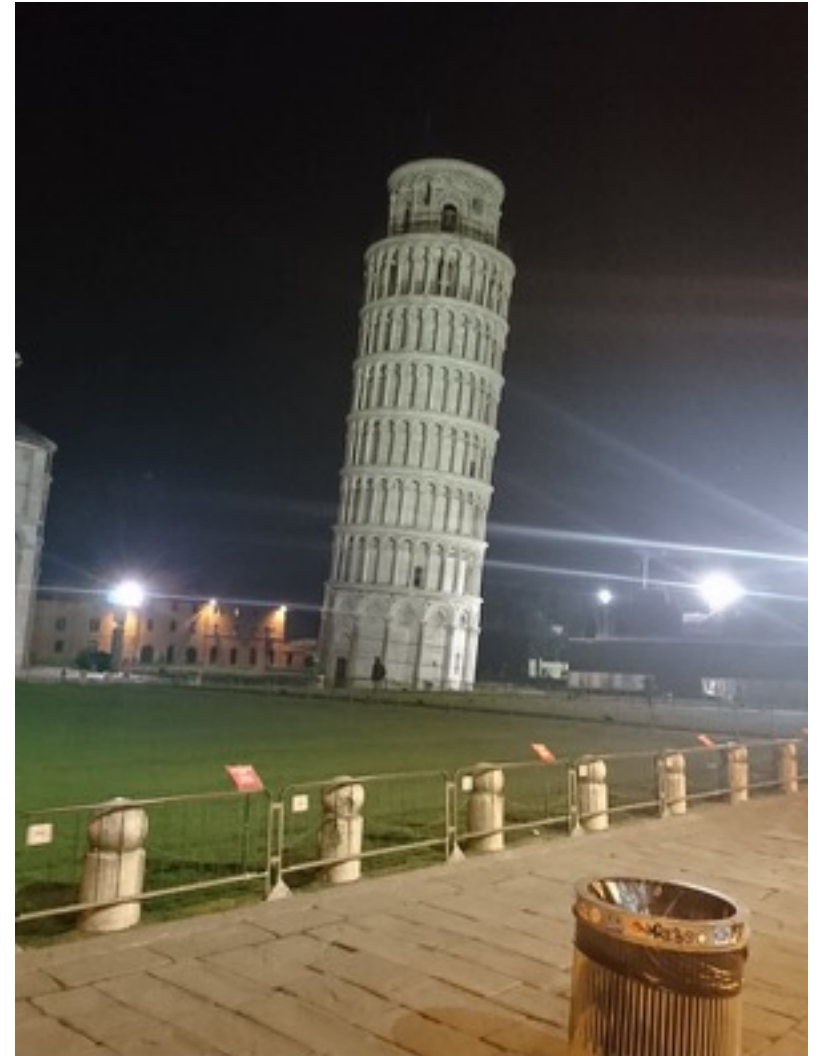
NE arm →



Photos



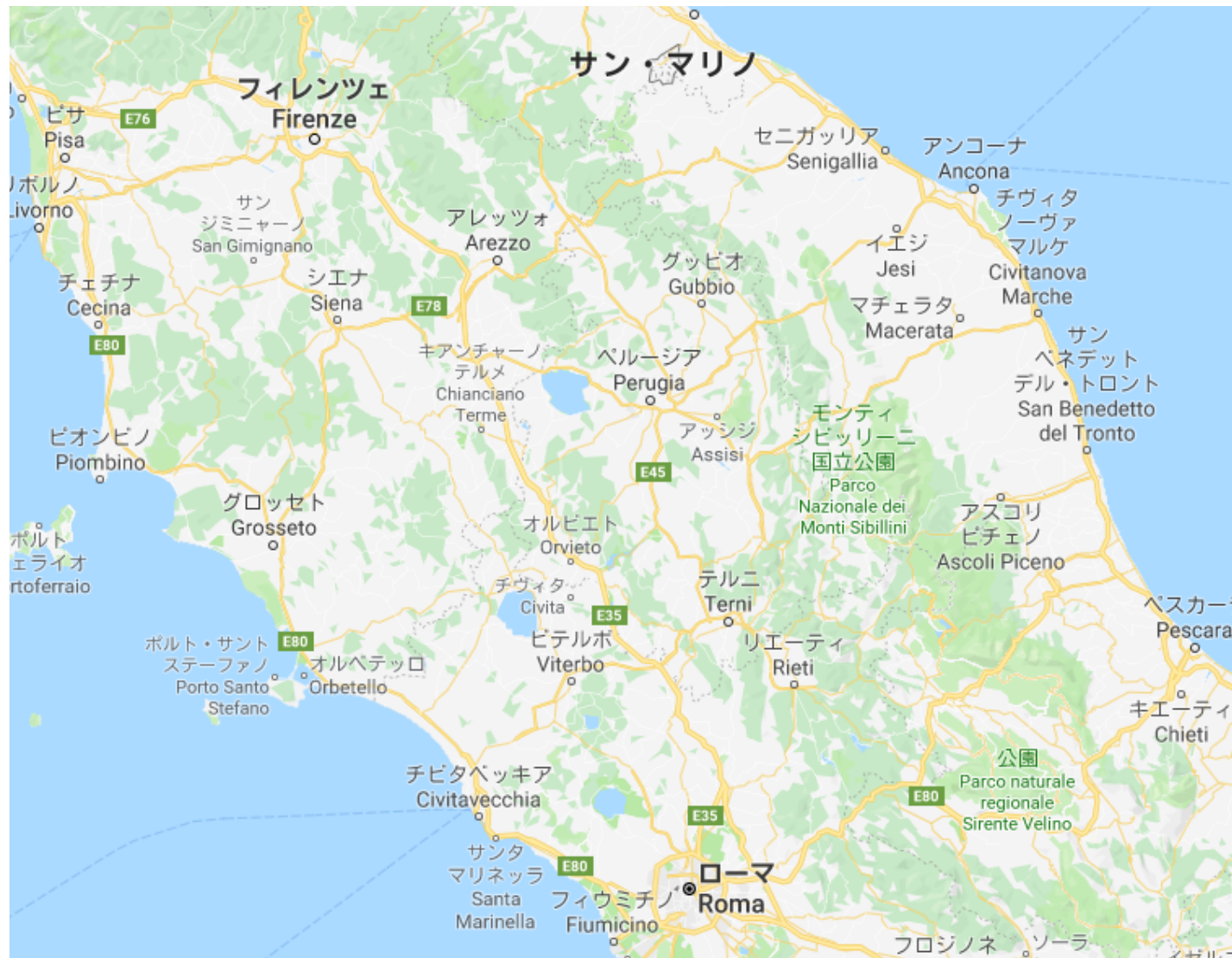
Photos



KIW5 & KV3GW

- KIW5 (the 5th KAGRA International Workshop)
: talks about KAGRA, similar to those in F2F
 - ▶ day1: on site
 - ▶ day2: data analysis, science
- KV3GW (the 1st Kagra-Virgo-3G Detectors Workshop)
: topics about R & D for ET
- My talk was in the last day (KV3GW)
- What I talked: NN measurement by TOBA
 - ▶ link: http://granite.phys.s.u-tokyo.ac.jp/takano/talks/KIW5_takano.pdf

Perugia

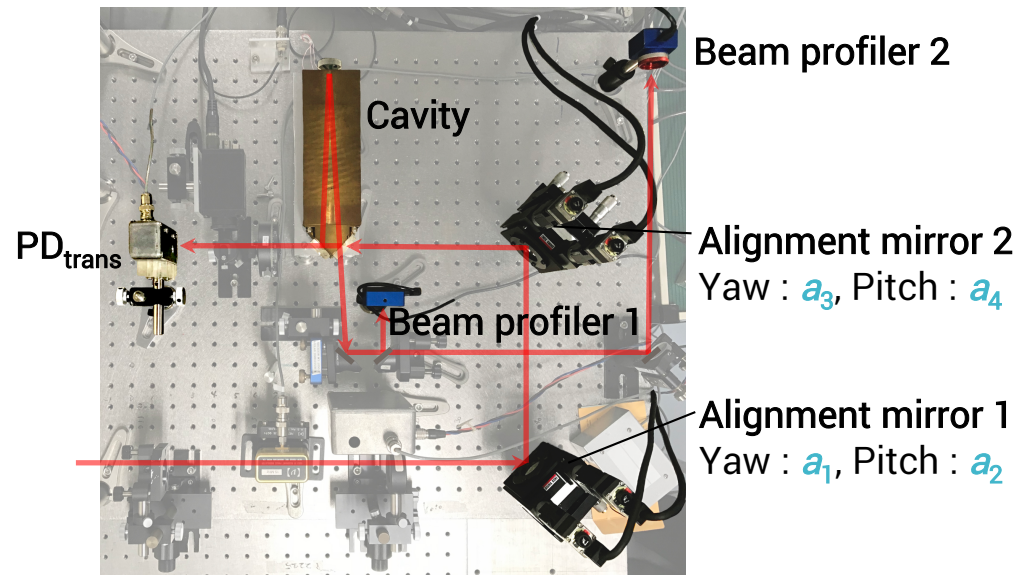


Reviews

- Auto-alignment system by machine learning
 - ▶ by Tahara-kun (M2, Mio lab)
 - ▶ alignment of a triangle cavity by adjusting input beam angle
- Constructing mode mismatch error signal
 - ▶ by Joris van Heijningen (University of Western Australia)
 - ▶ Obtaining mode mismatch error signal in a coupled cavity
 - ▶ A kind of WFS?

Auto-Alignment by machine learning

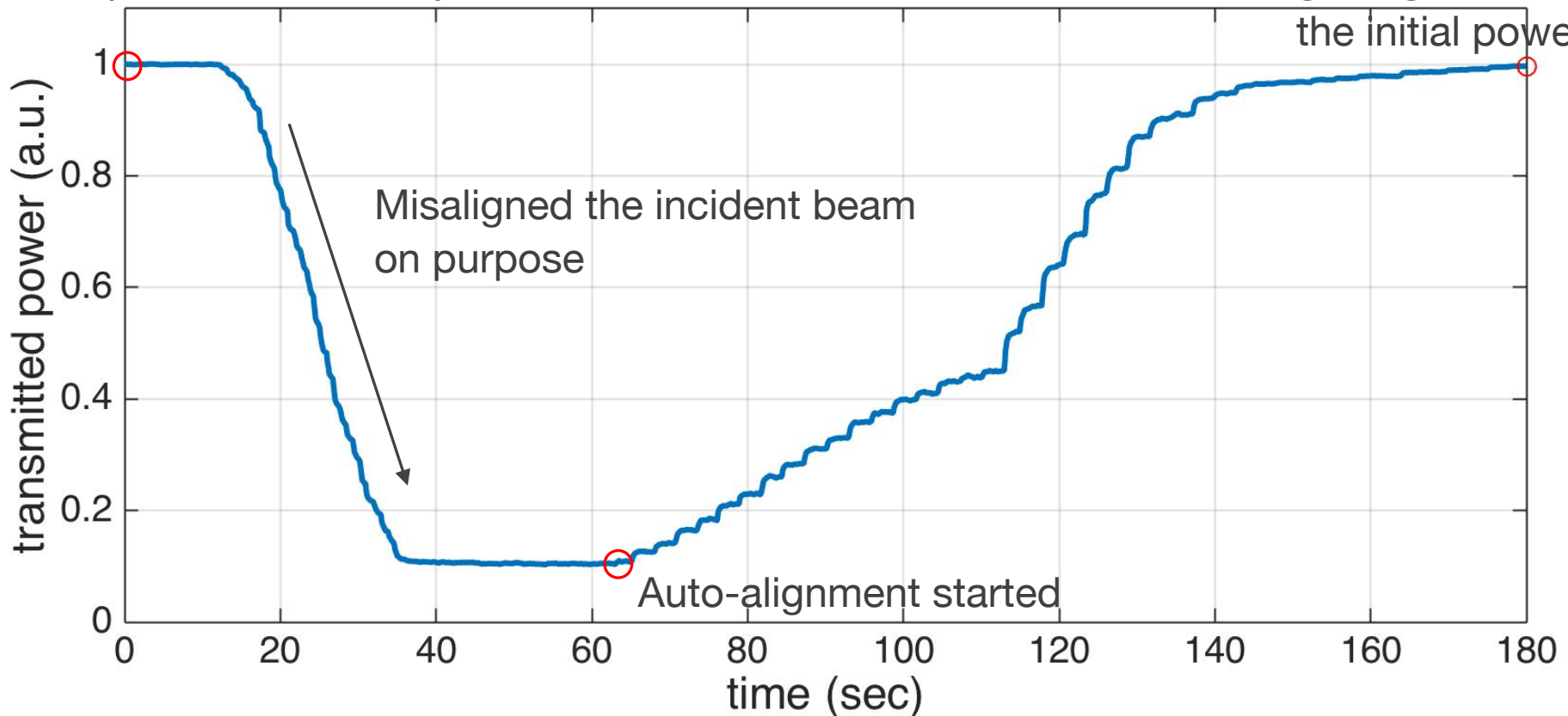
- Aligning a triangle cavity by using two mirrors
- 3 minitors:
 - ▶ PD: the power of the transmitted light
 - ▶ beam profilers: the beam shape of the reflected light near and far from the cavity
- Finding a mirror angle set where PD output is maximum (the cavity is on resonance)
- How to know which angle should we move to?
 - ▶ machine learning!
- But I couldn't understand what he said about machine learning...



Battle against Prof. Mio

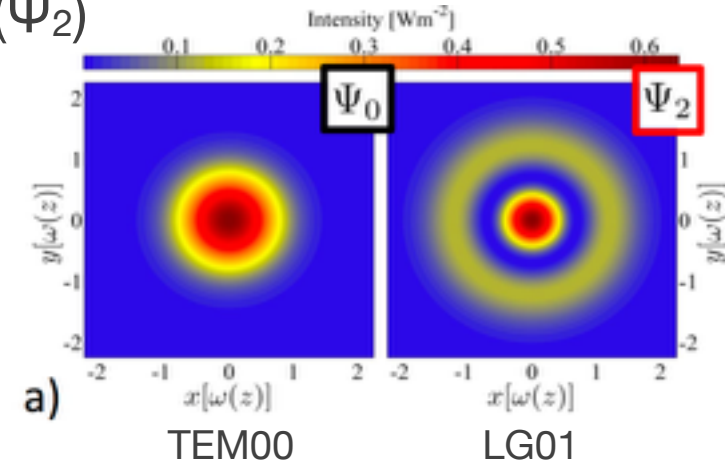
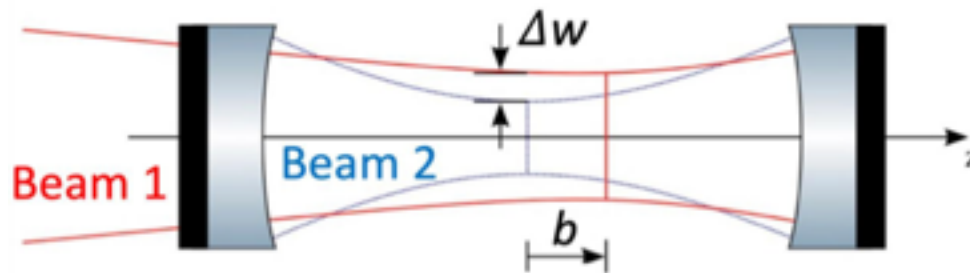
Prof. Mio aligned as completely as possible he can by hand.

Succeeded in getting back the initial power



Constructing mode mismatch error signal

- Getting mode mismatch error signal in a coupled cavity by beat signals between TEM00(Ψ_0) and LG01 (Ψ_2)



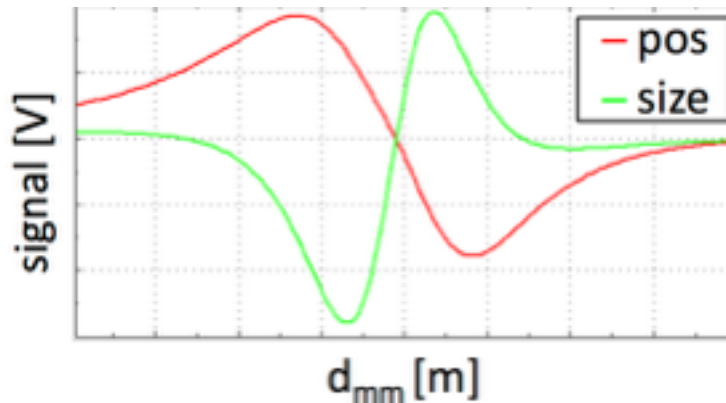
- If beam1 (the input beam) doesn't match with beam2 (cavity eigenmode), the reflected beam is like this:

$$E_{\text{pos}} \propto \left[\Psi_0 + i \frac{b}{2kw_0^2} (\Psi_0 + \Psi_2) \right]$$

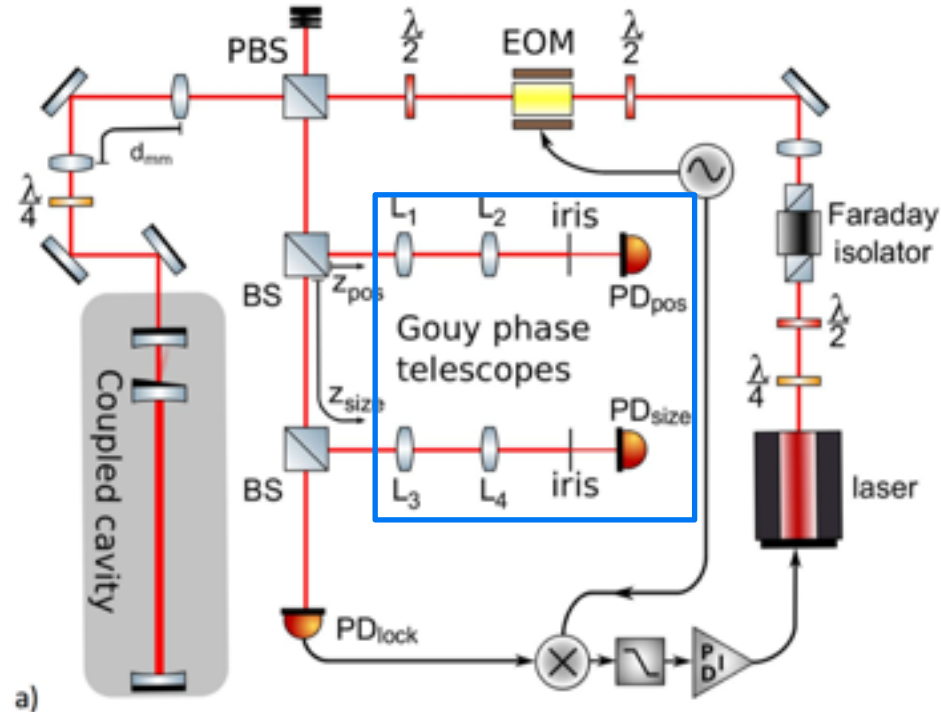
$$E_{\text{size}} \propto \left[\Psi_0 + \frac{\Delta w}{2w_0} \Psi_2 \right],$$

How to get the error signal

- Measuring the power at two different place where the Gouy phase between Ψ_0 and Ψ_2 is 0° and 90°
- Simulation by FINESSE: ↓



- A table top experiment is under construction



Photos





PRM

End