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06.05.2011

Outline



We are laser power limited



New laser



New mirrors for MC1 & MC2

Outline

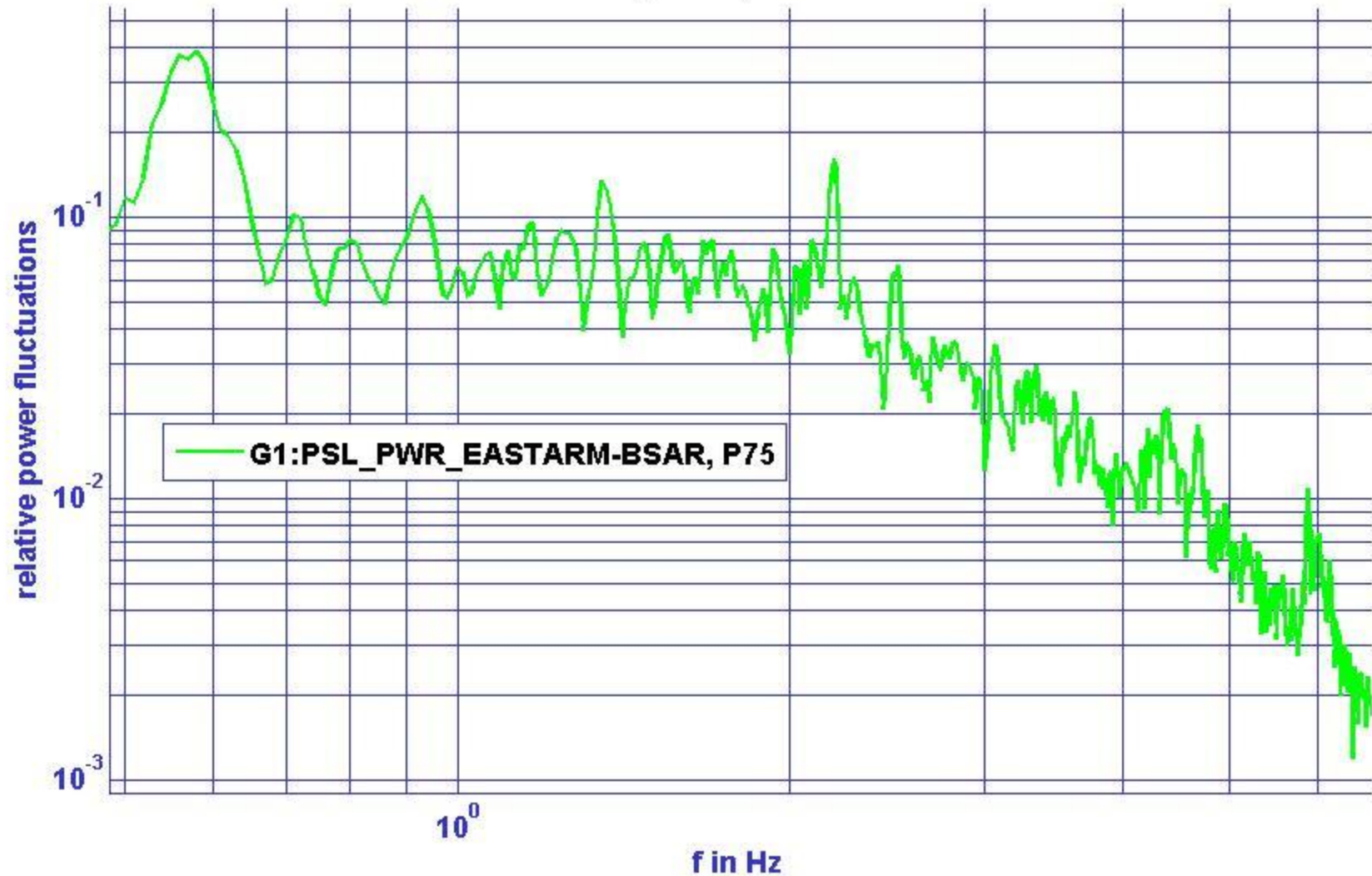


Laser power limited

- High power – instabilities
- Laser stray light coupling
- Modulation Drive (MD)
- High power operation now stable

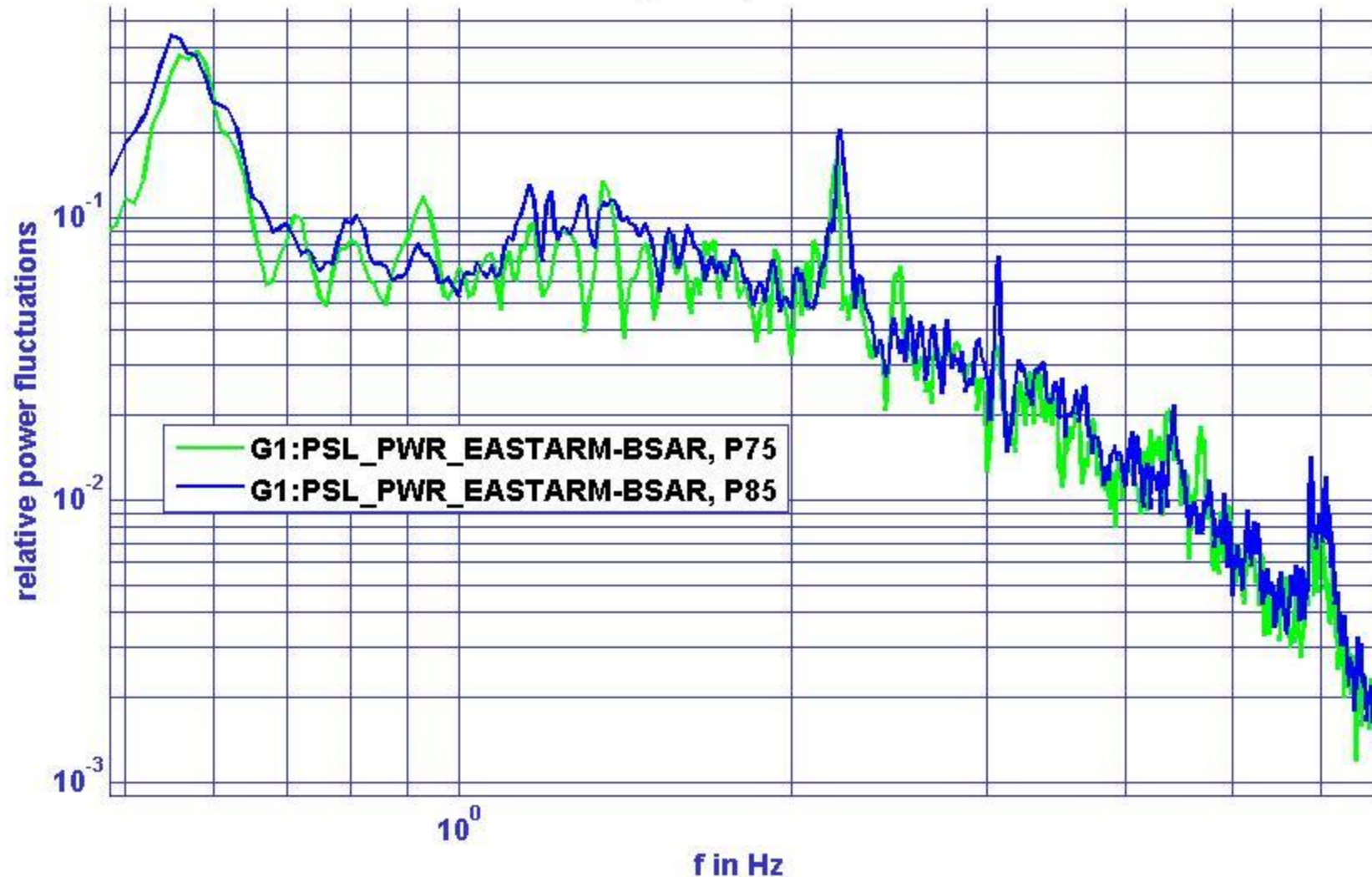
Power fluctuations ...

Normalized plot of power fluctuations



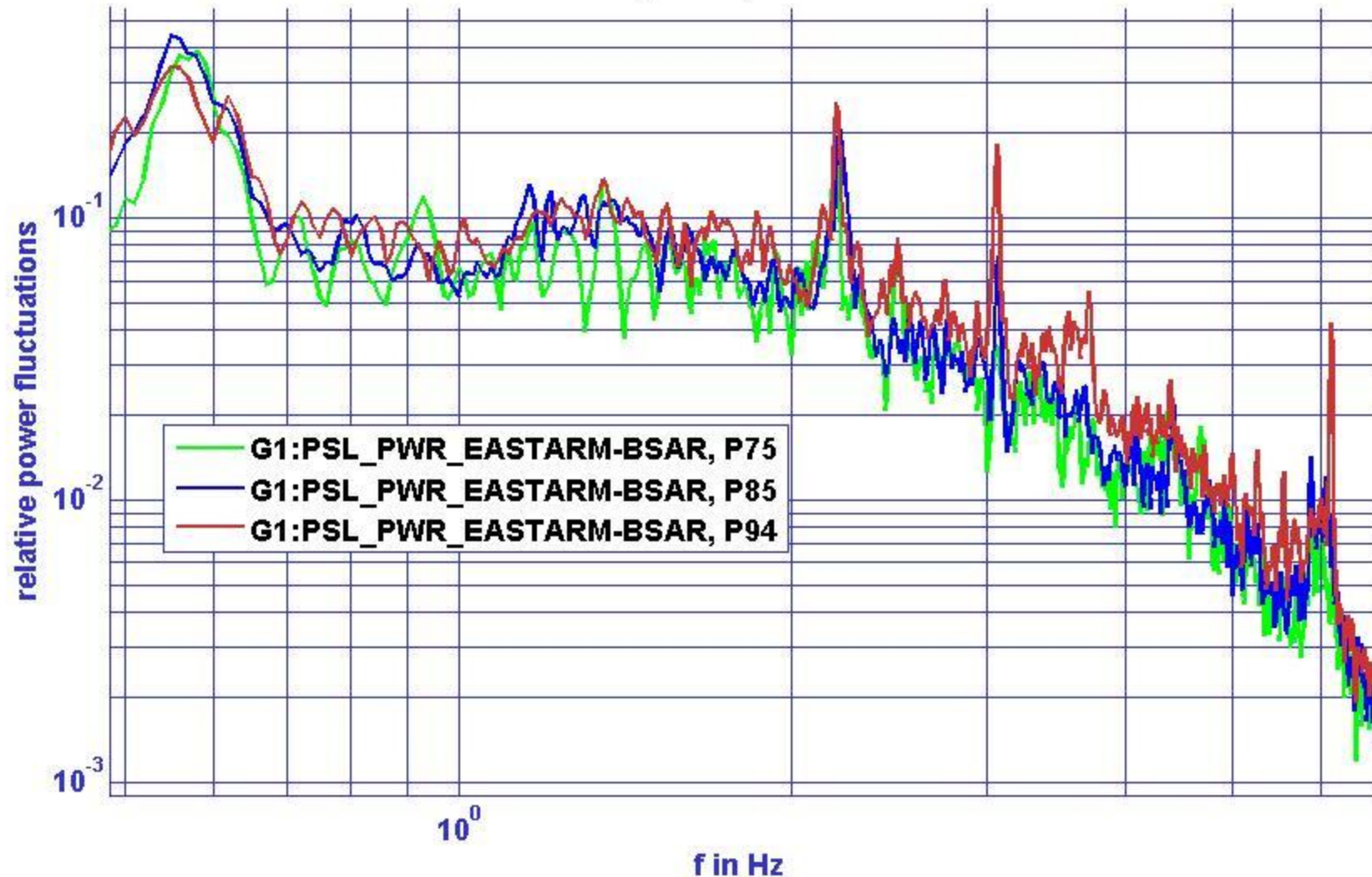
Power fluctuations ...

Normalized plot of power fluctuations



Power fluctuations ...

Normalized plot of power fluctuations



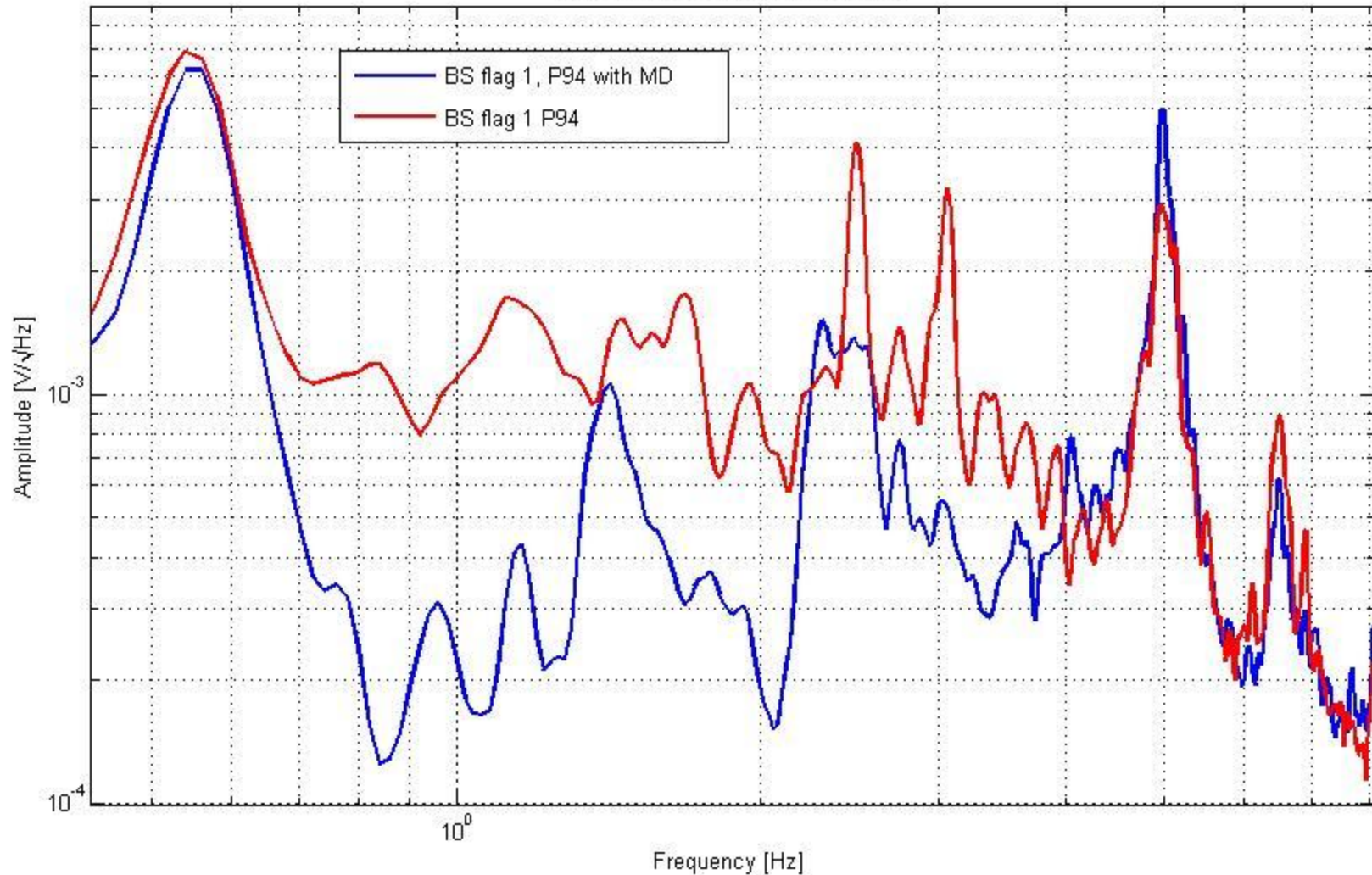
...and stray light

- Mechanical resonances damped by local control system
- Sensors used for measuring movement of uppermost mass
- Sensors sensitive for scattered light of the ifo mirrors!
- Contaminated error signals
 - misaligning mirrors
 - instability

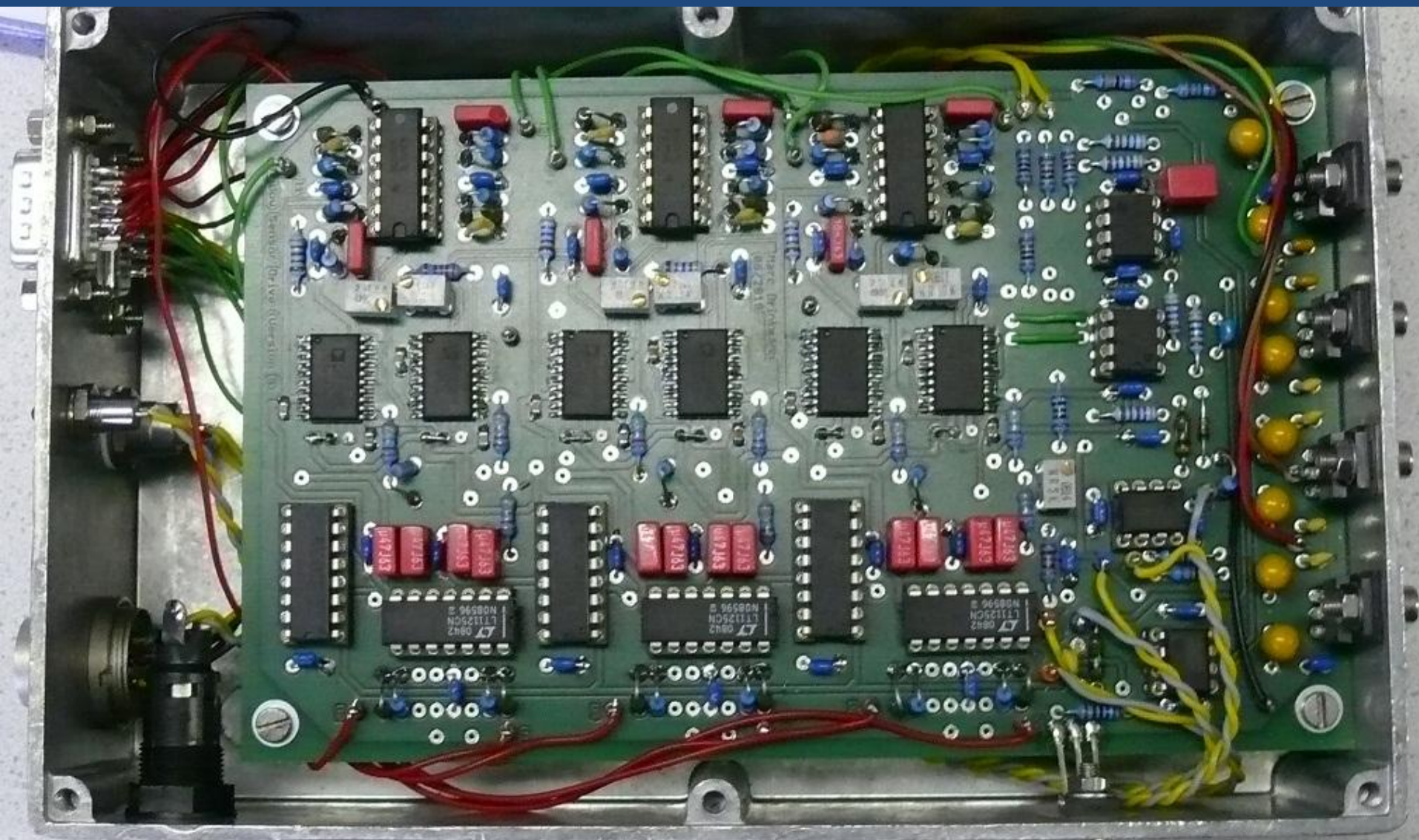


More stray light

Spectrum plot using Kaiser window

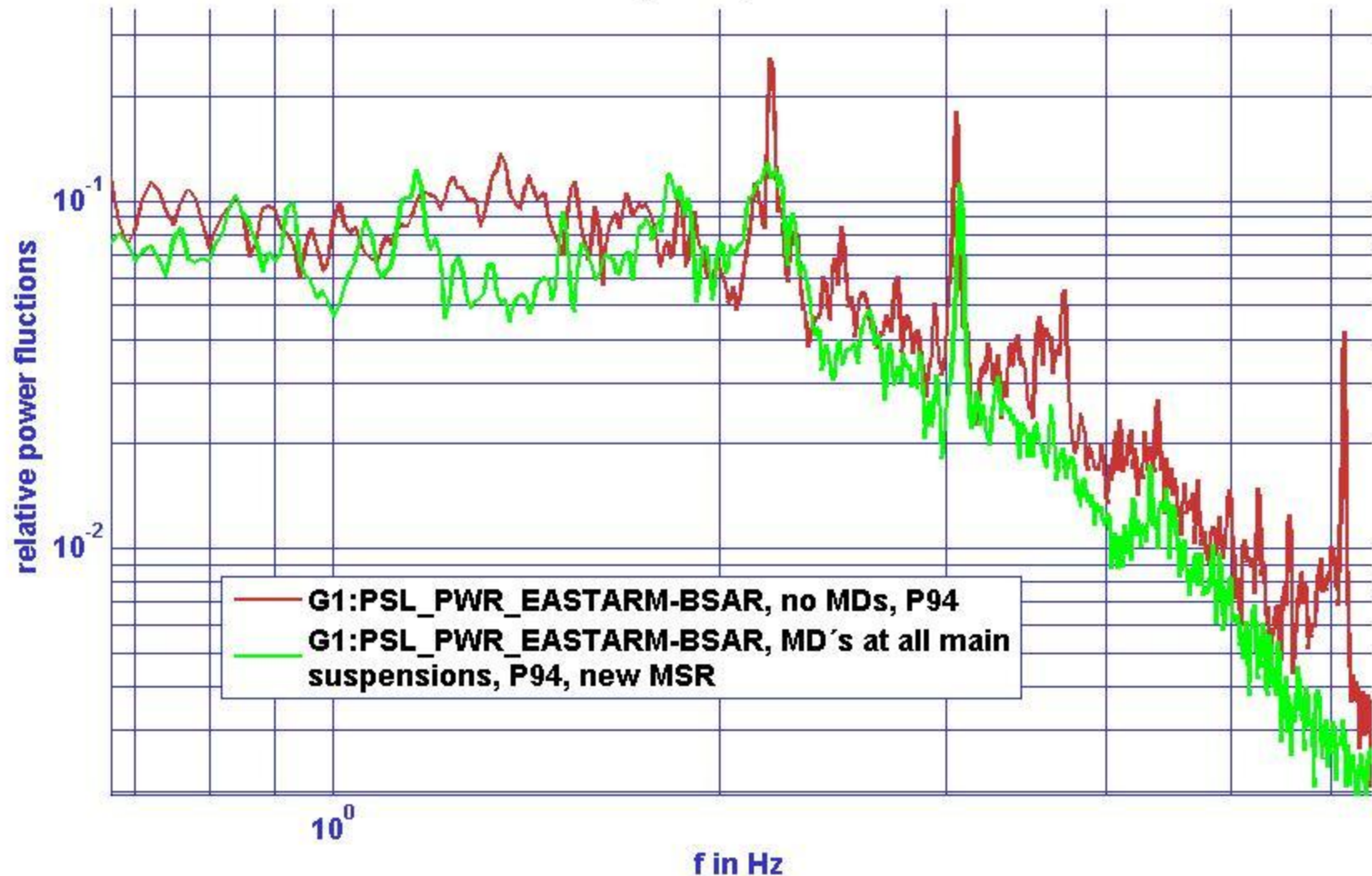


Modulation Drive

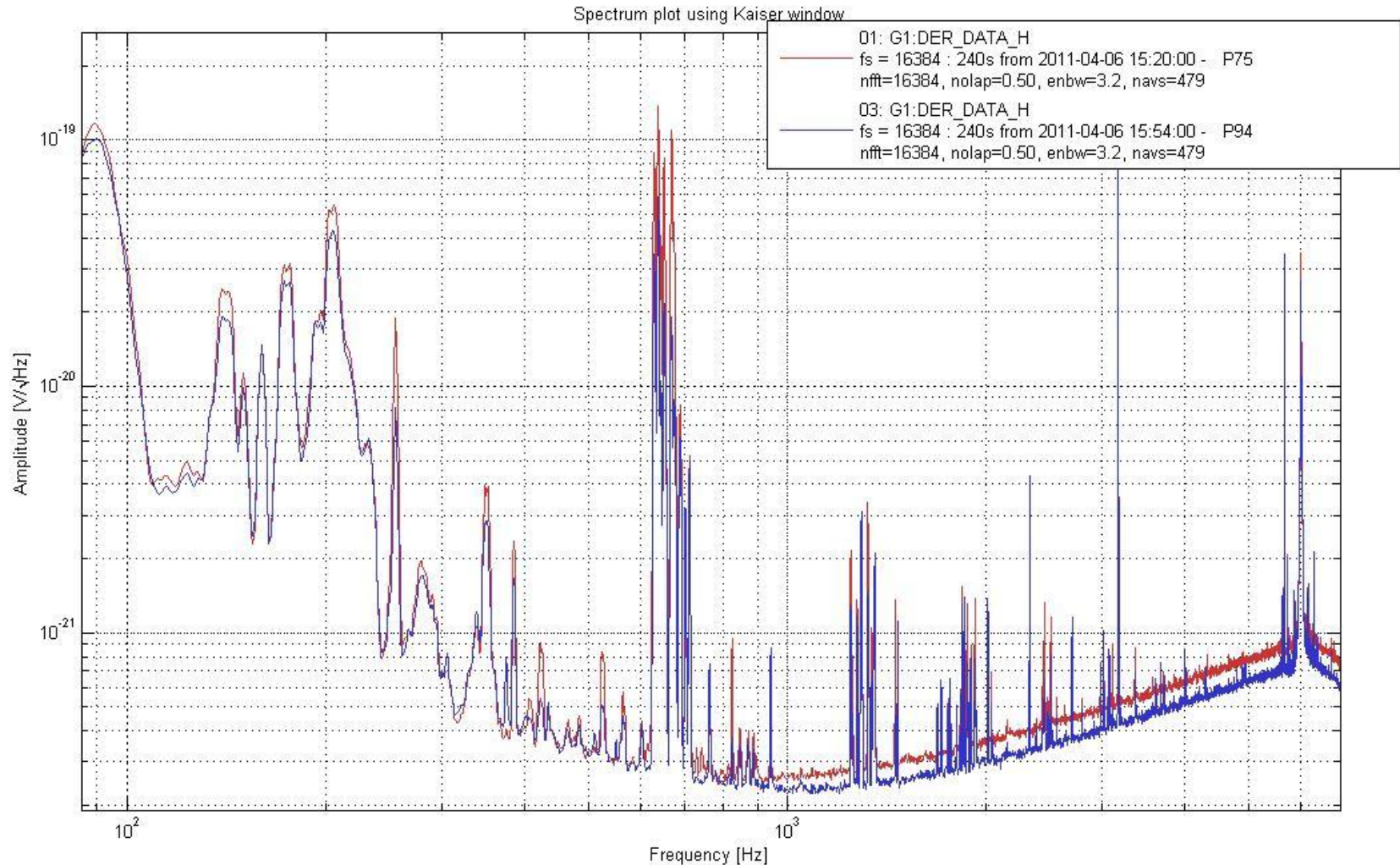


Modulation Drive

Normalized plot of power fluctuations



Laser power limited!





The new laser

- Amplifies NPRO with 2W up to **35W**.

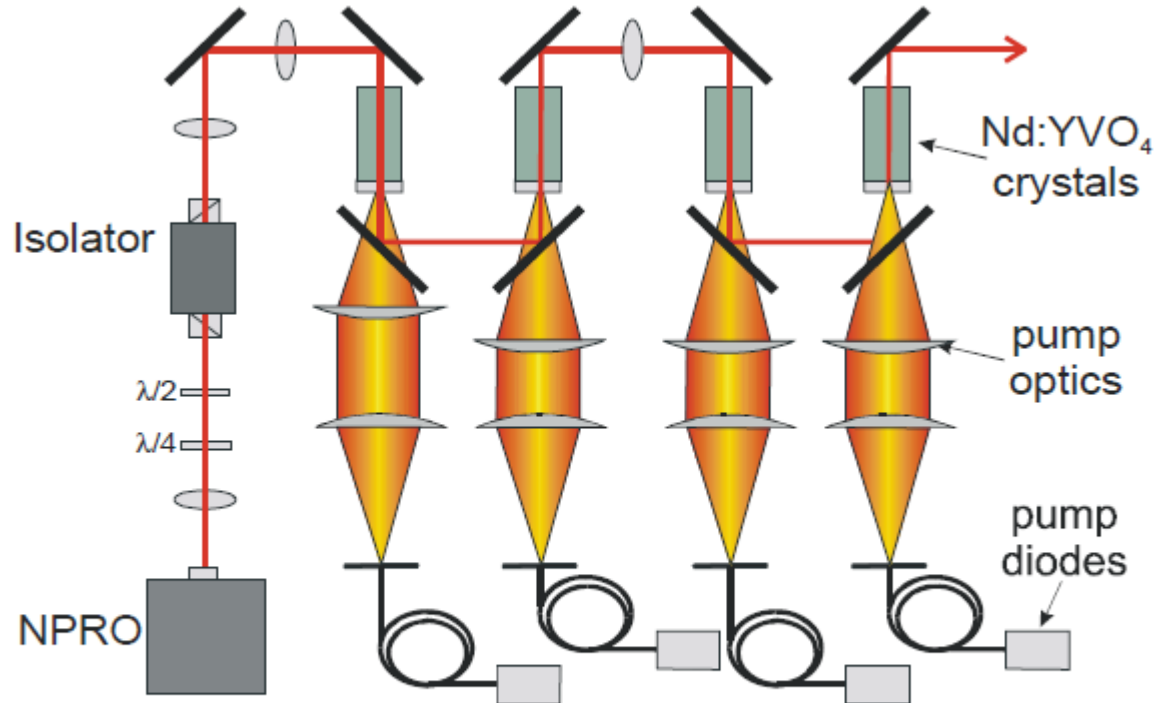
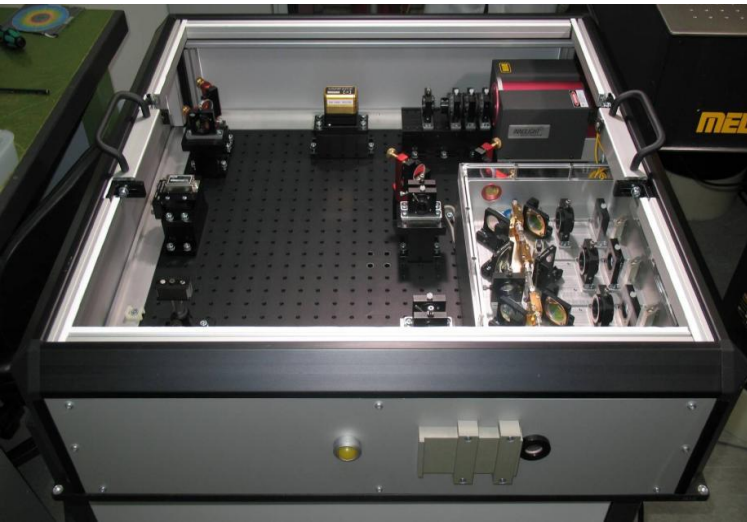
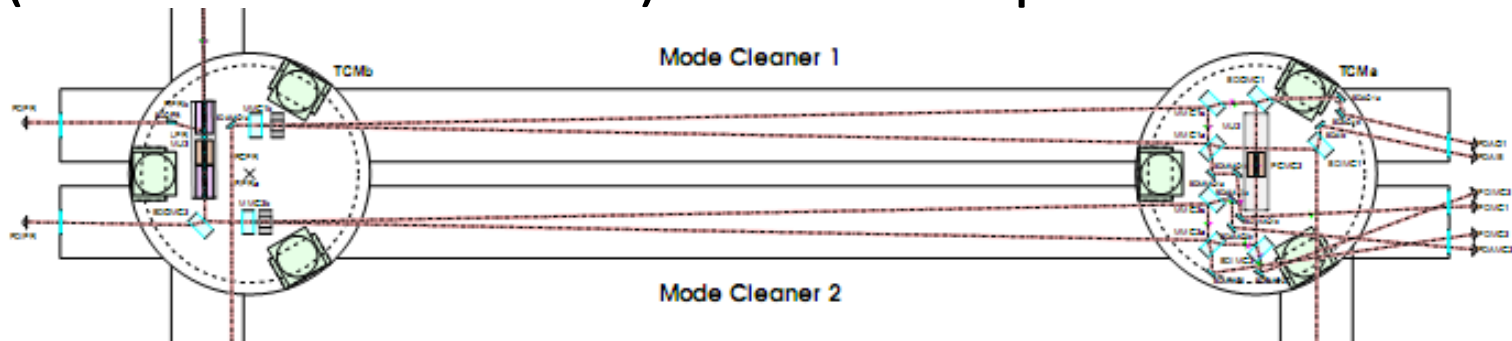


Fig. 1. Setup of the four stage amplifier design with an NPRO seed source.

Lowering MC finesse

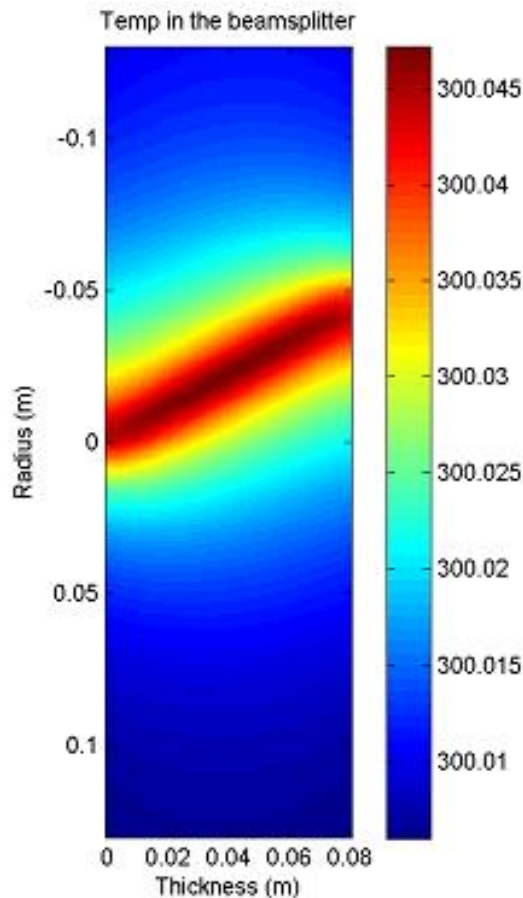
- Lowering finesse of the input MC
(changing input and output mirror)
- ($T=0.45\%$ \rightarrow $T=0.90\%$) \rightarrow factor 2 power increase



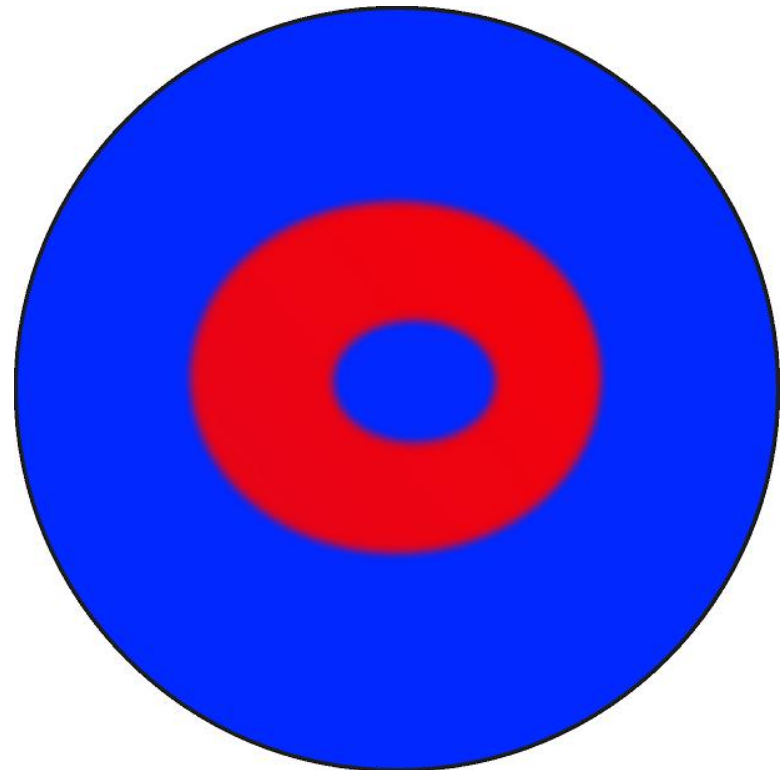
- In combination with the new laser:
Stored light power of 20kW instead of 3kW
(After solving certain problems ...)

Thermal lens

- The Problem



- One Solution:
Heating the BS surface



LEMMING
× □

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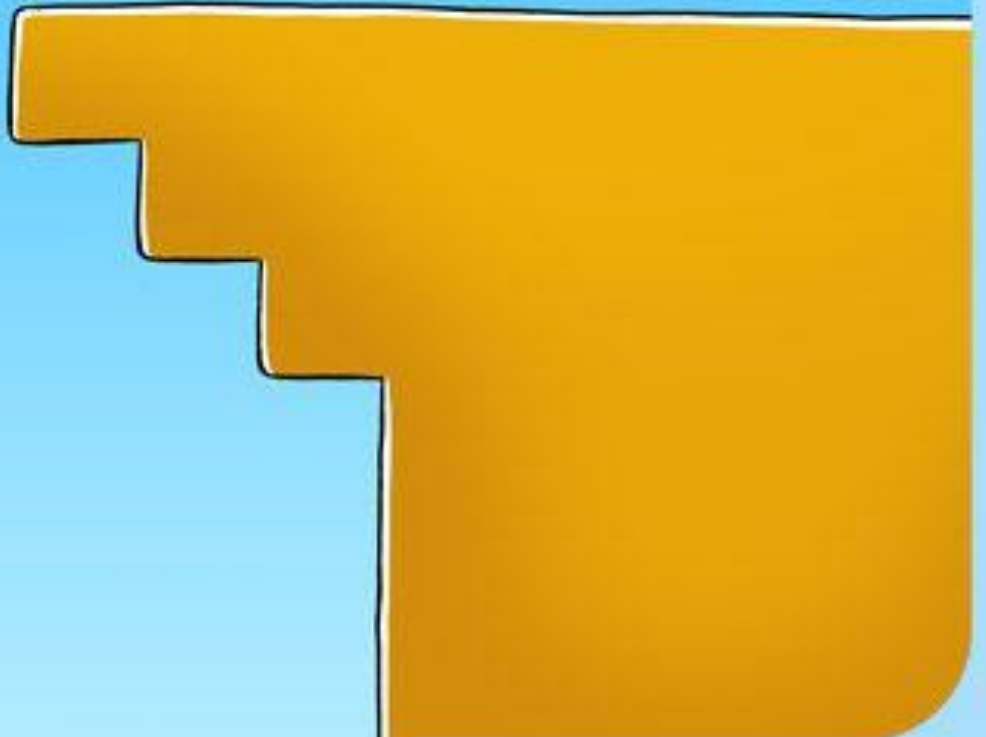
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TIME
247

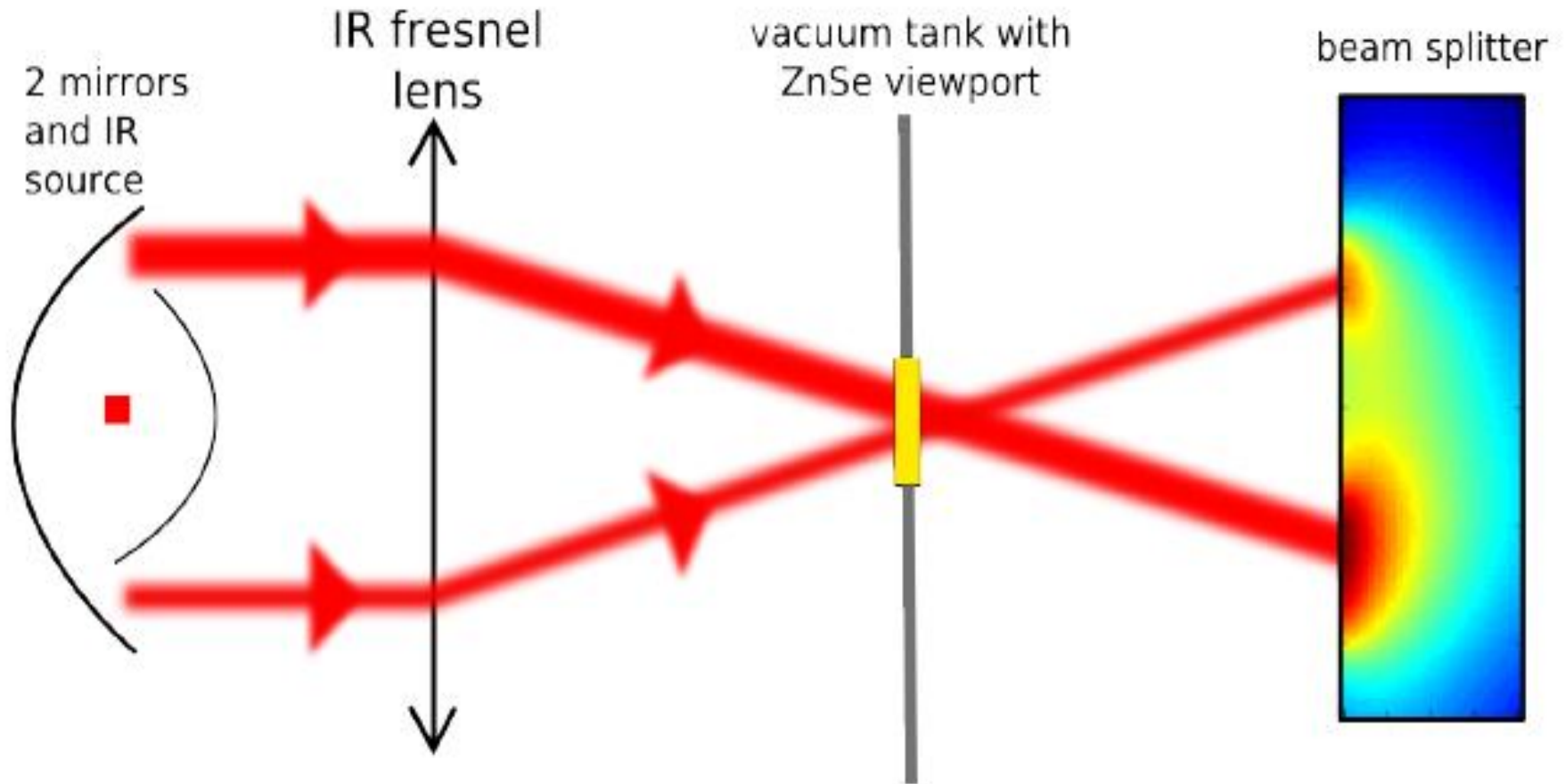
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1004

Thank you for your attention!

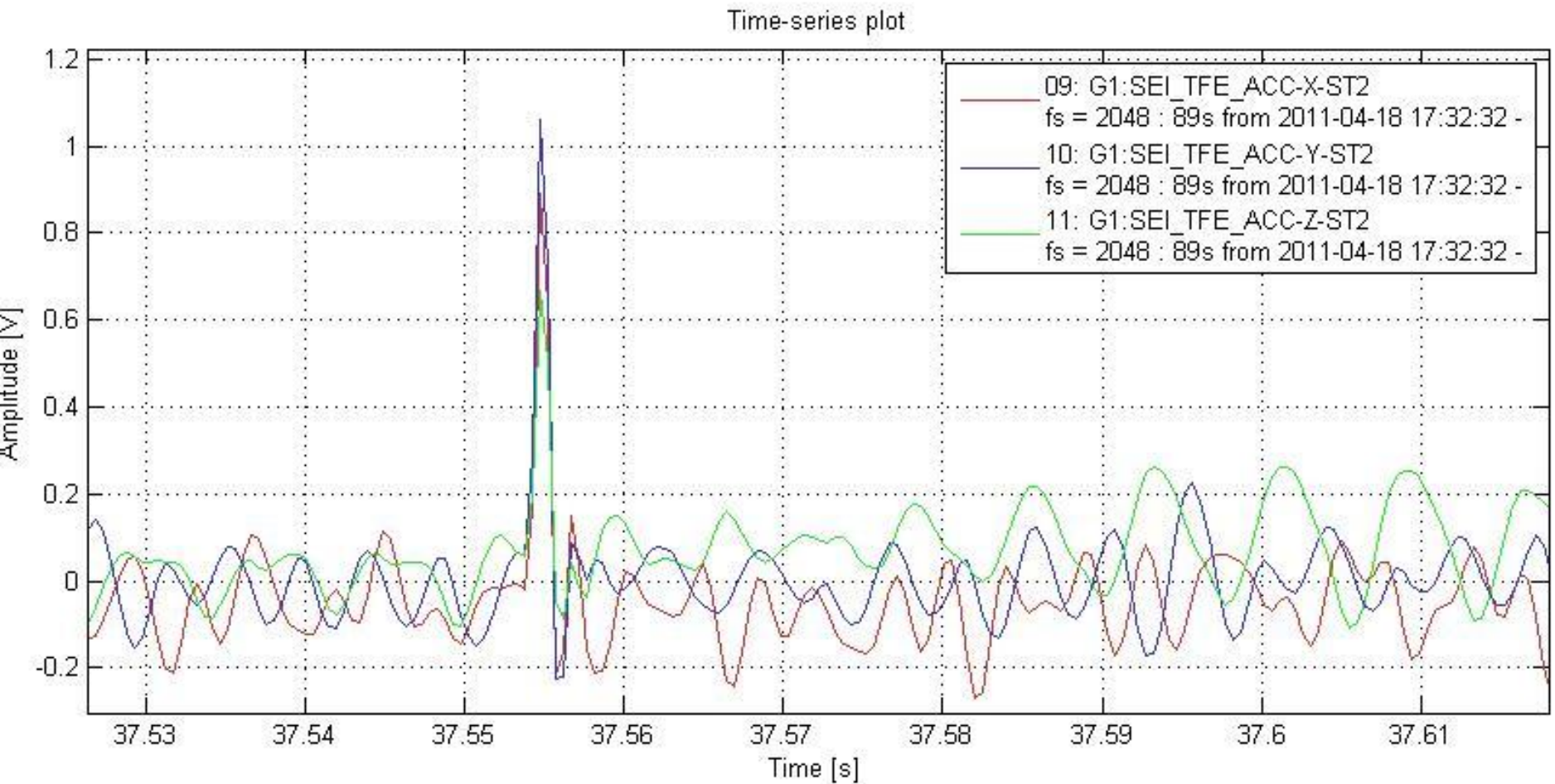


- Add. Infos on following slides – not in the actual talk:

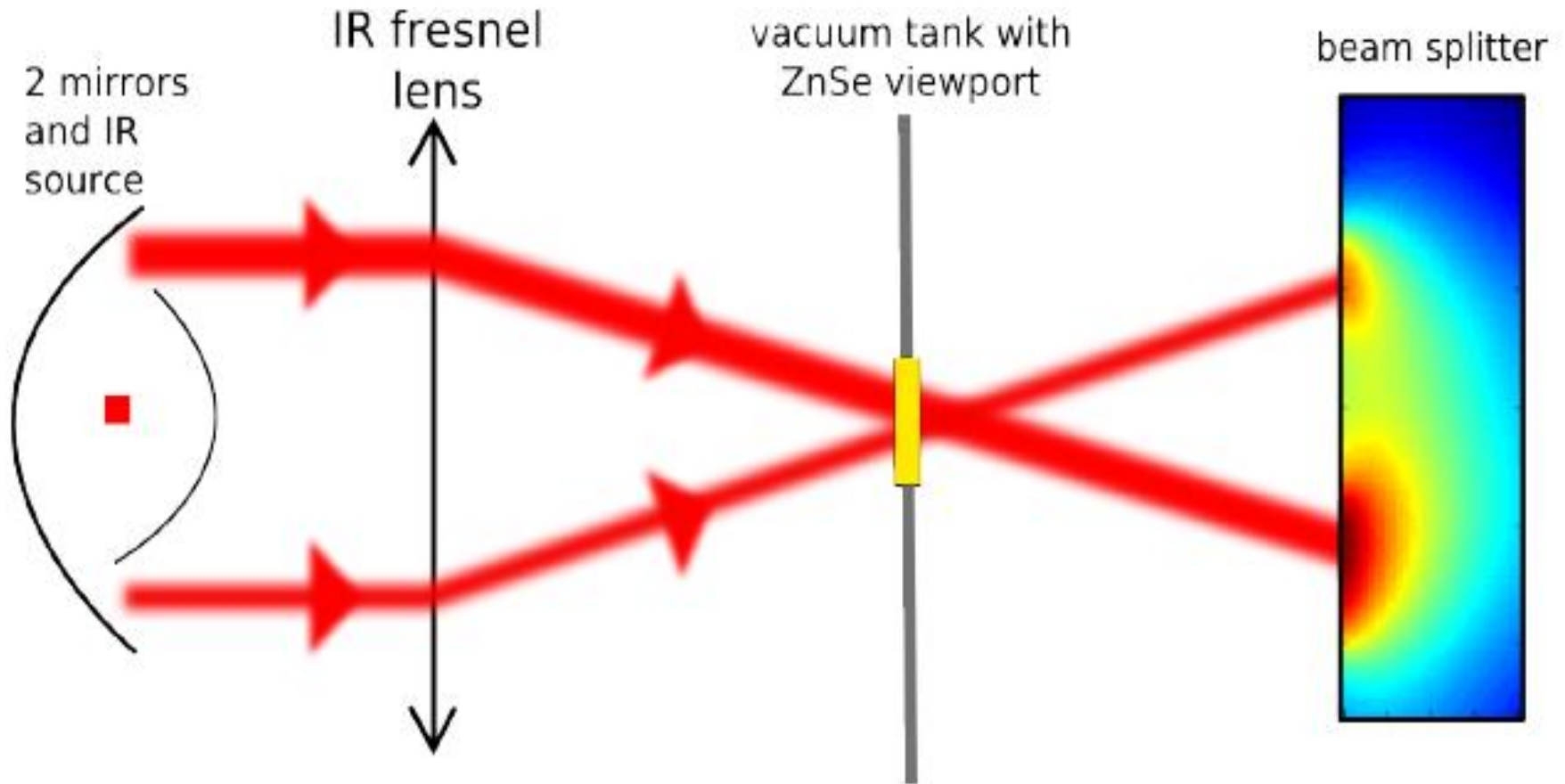
Thermal lens



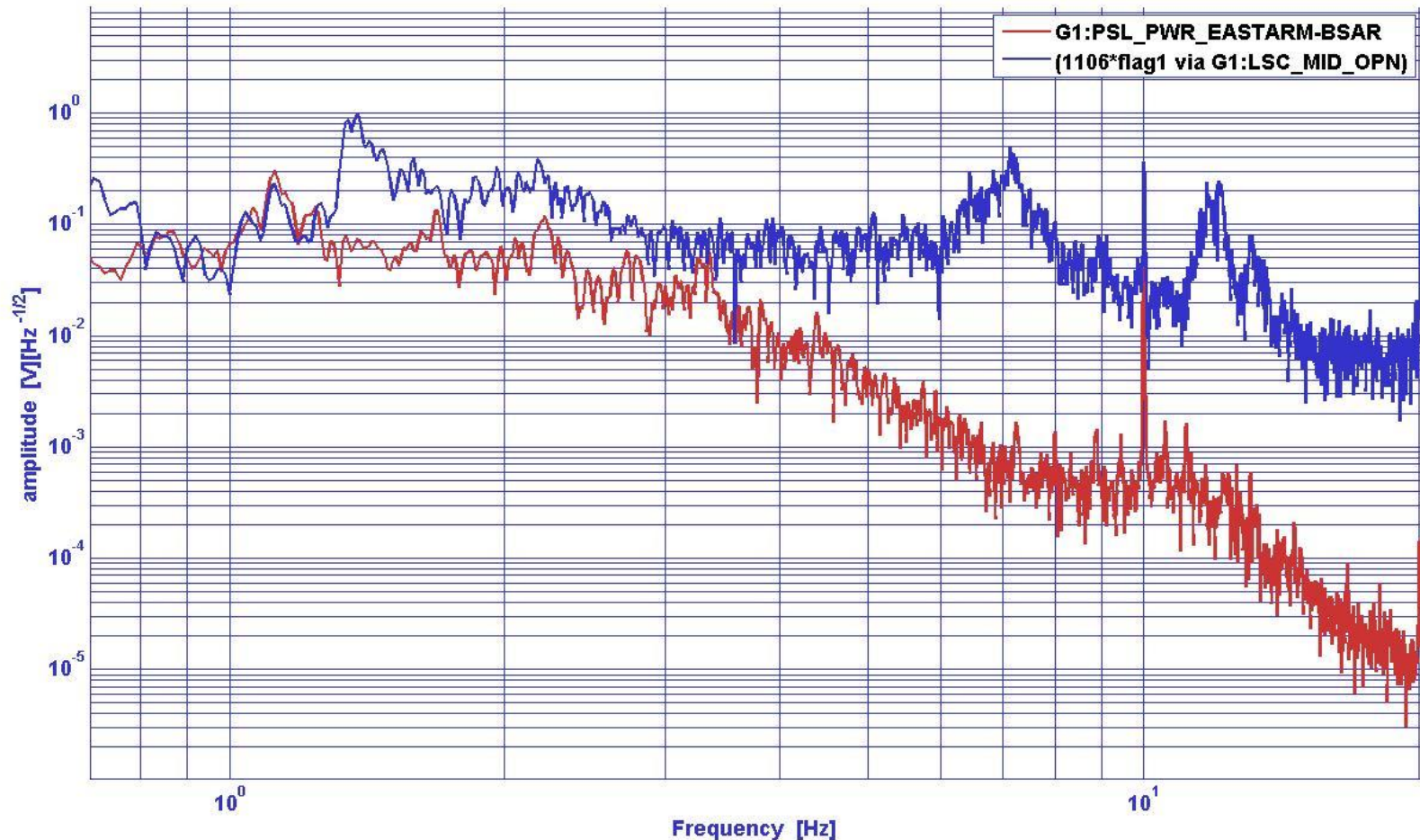
Lock losses



Thermal lens



Laser power fluctuations coupling to the local control



Laser power limited!