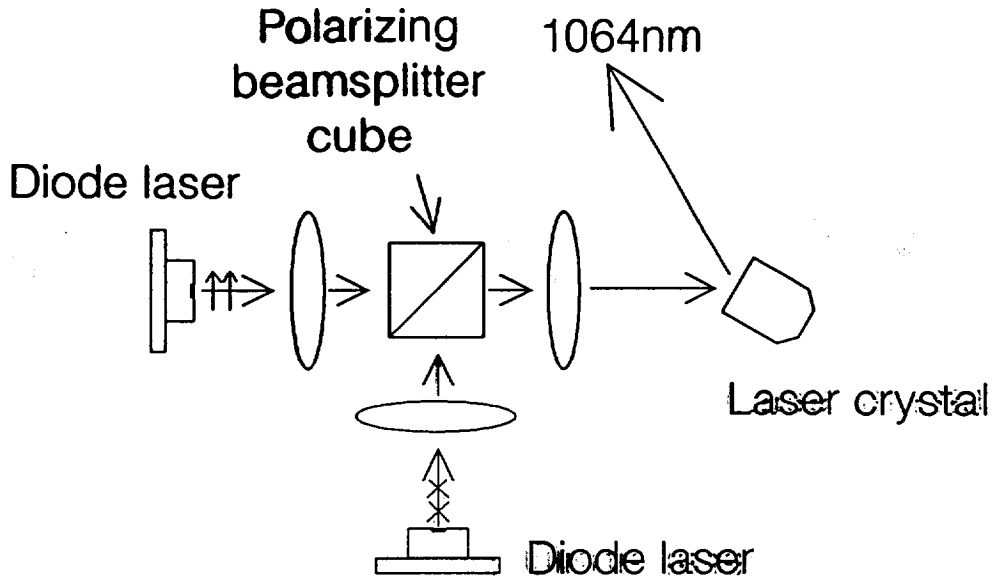


Monolithic Nd:YAG ring laser



# Pump Scheme

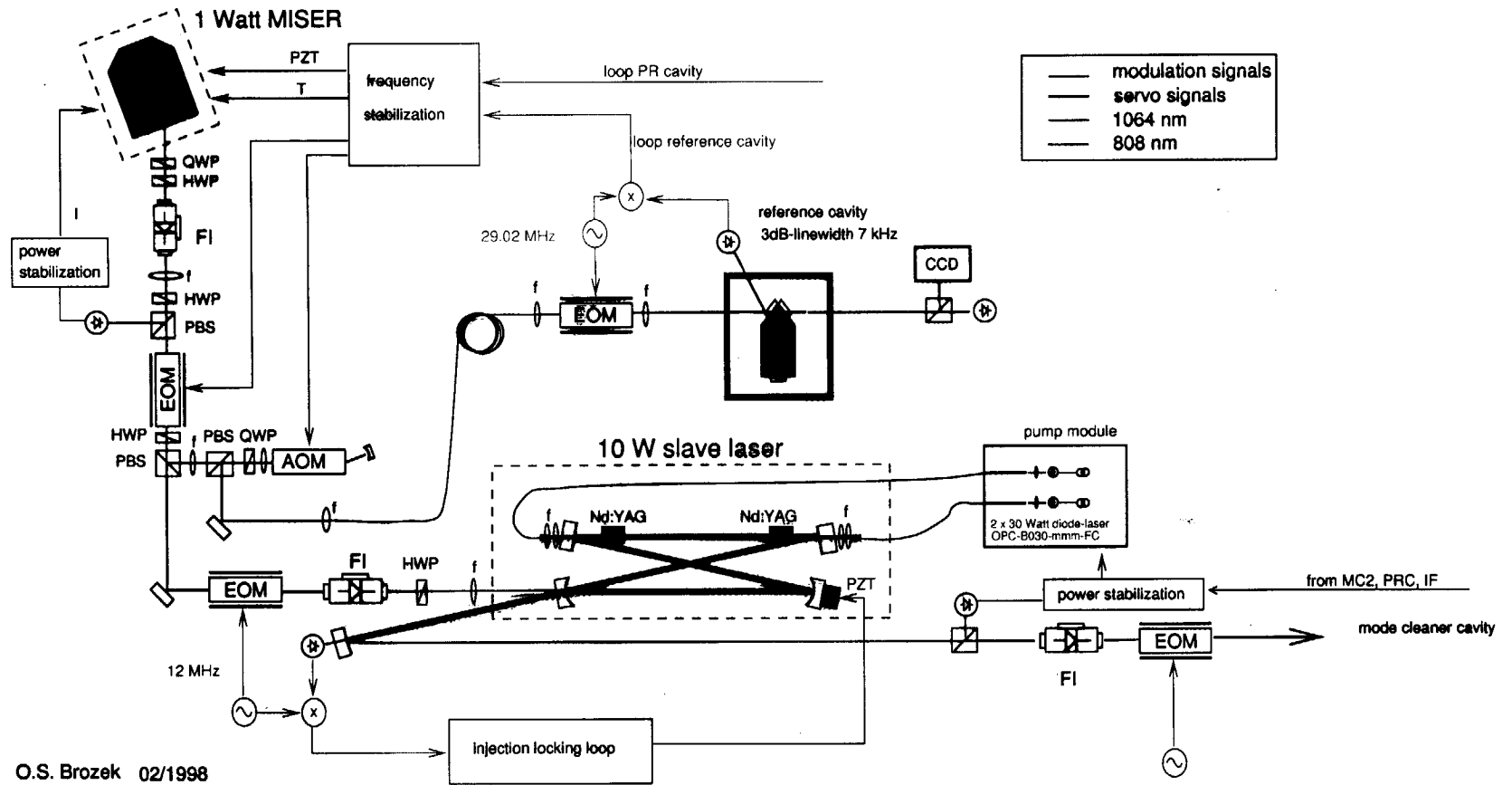


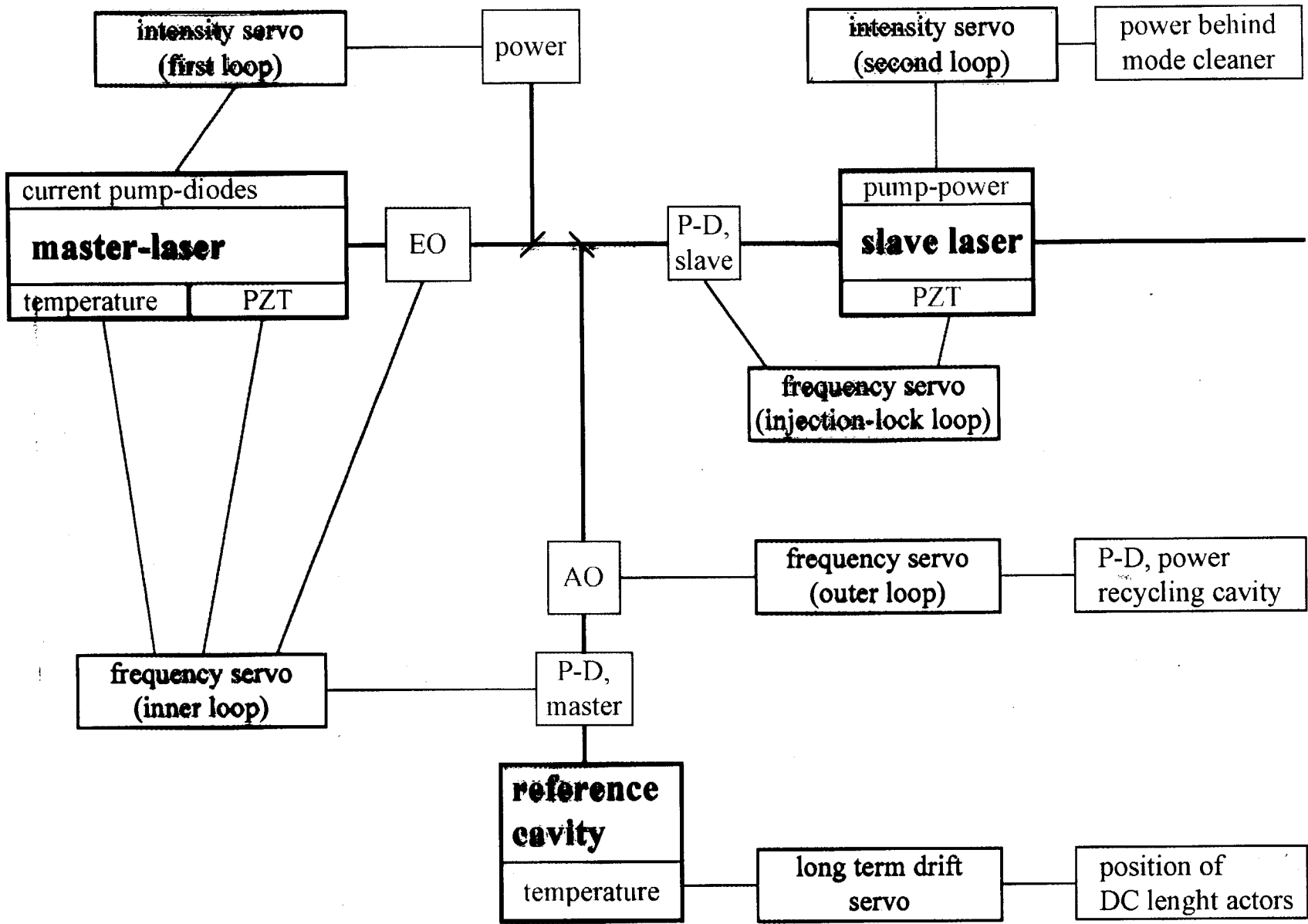
Diode lasers:  
Siemens SFH 487401  
emitting aperture 1x200um  
output power 1W cw

Maximum pump power:	2.0W
Maximum output power:	1.1W
Slope Efficiency:	60%
Electrical/optical Conversion efficiency:	>15%



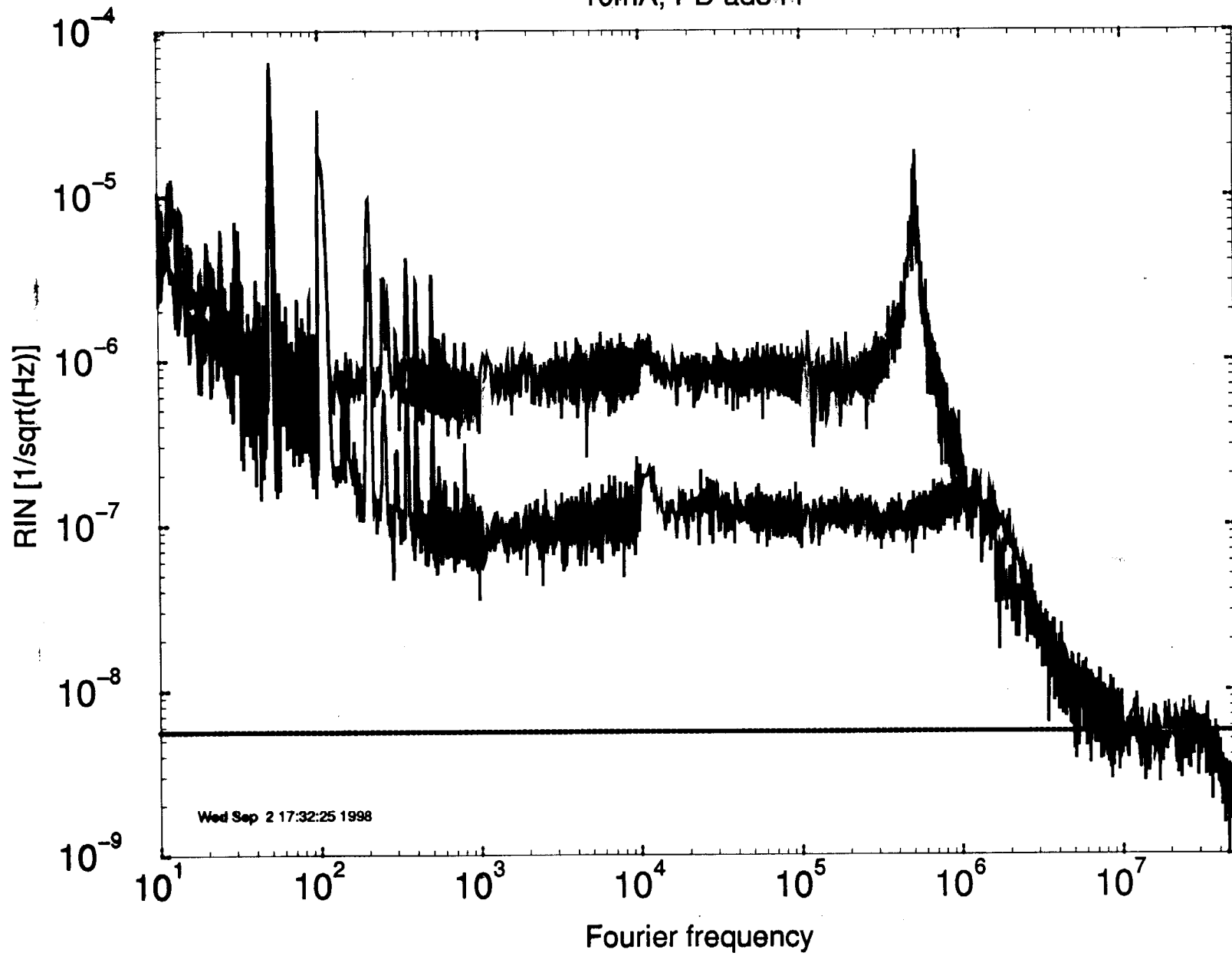
# OPTICAL LAYOUT



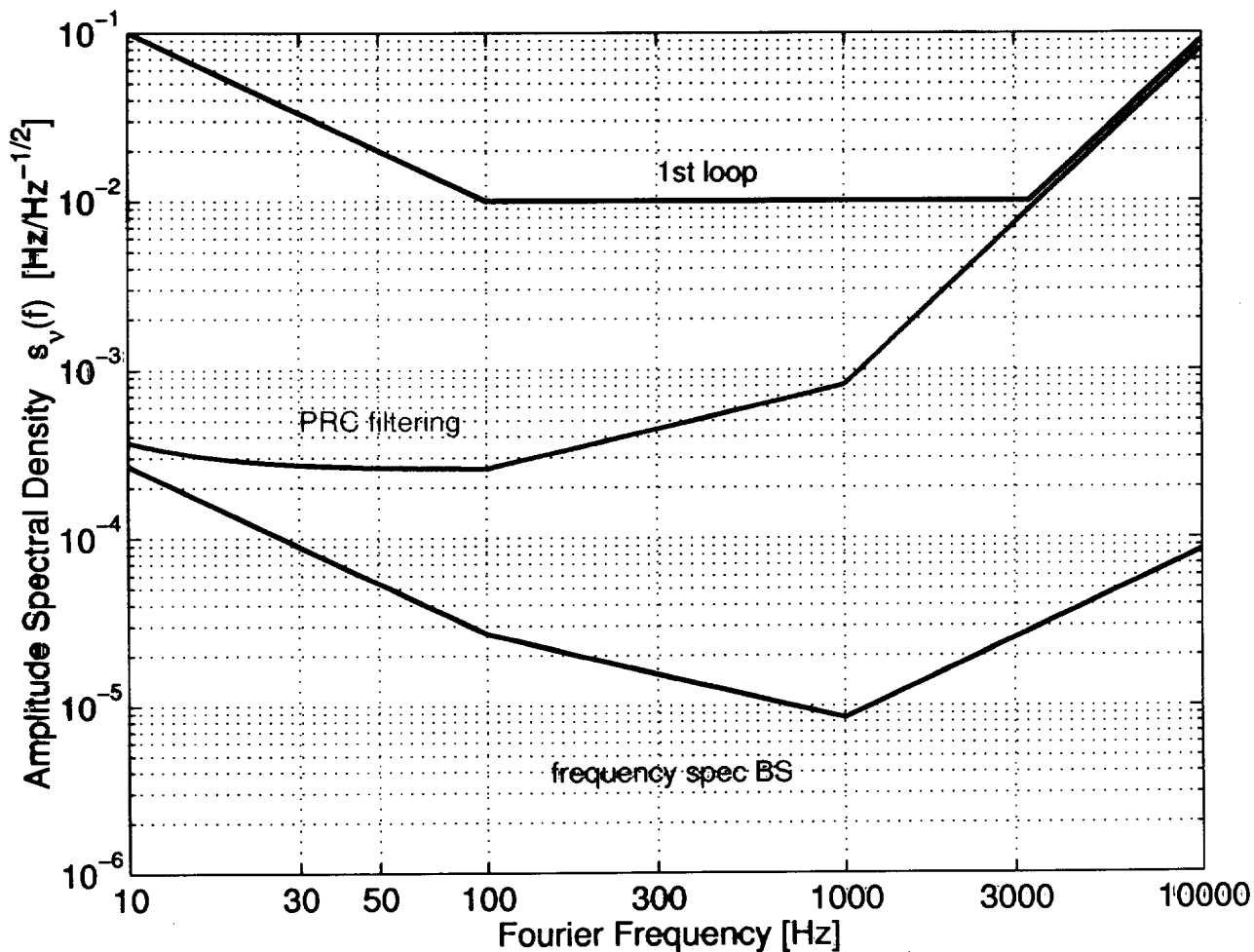


# Relative intensity noise, master laser

10mA, PD ad844



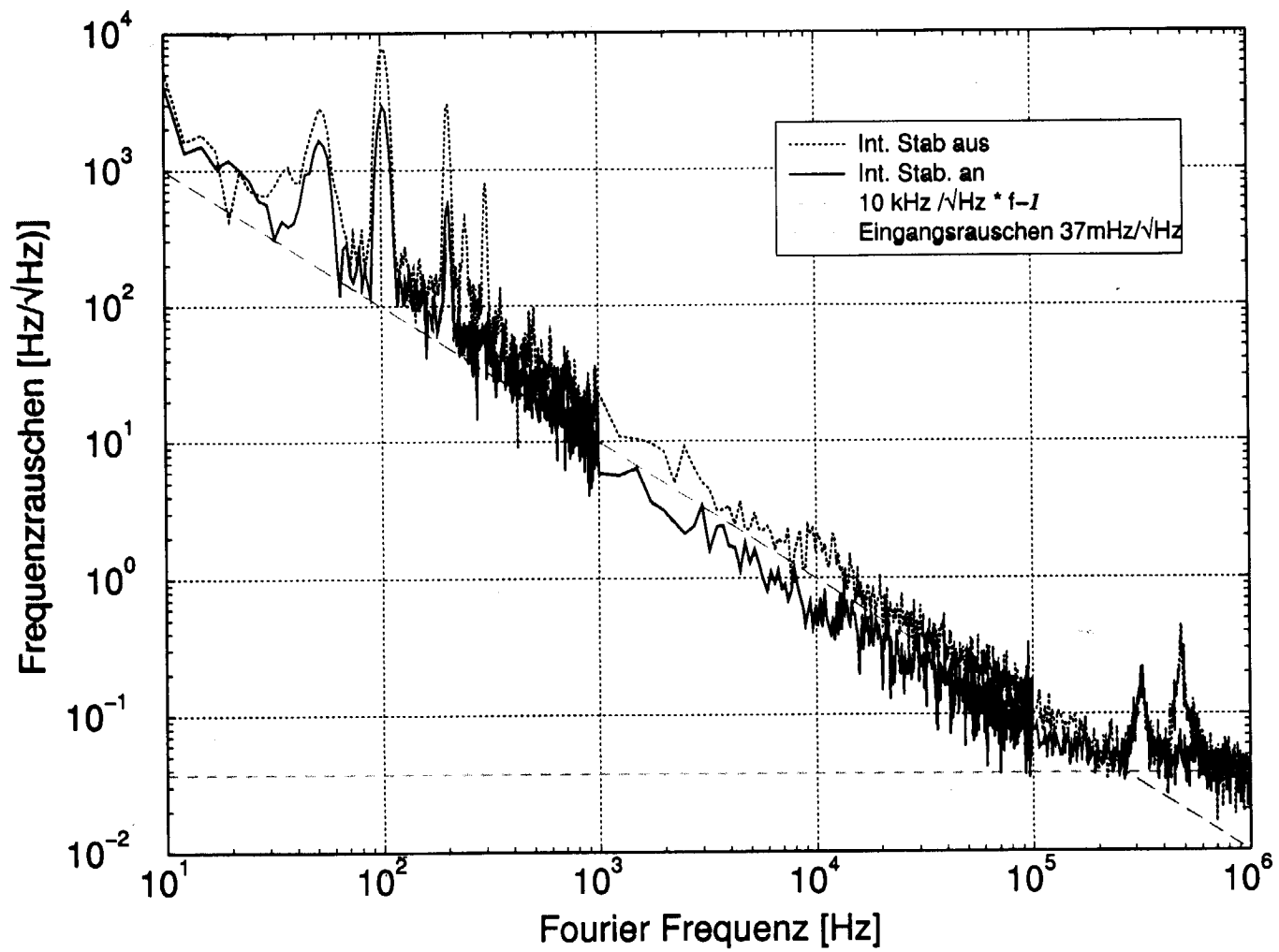
# FREQUENCY SPECIFICATION



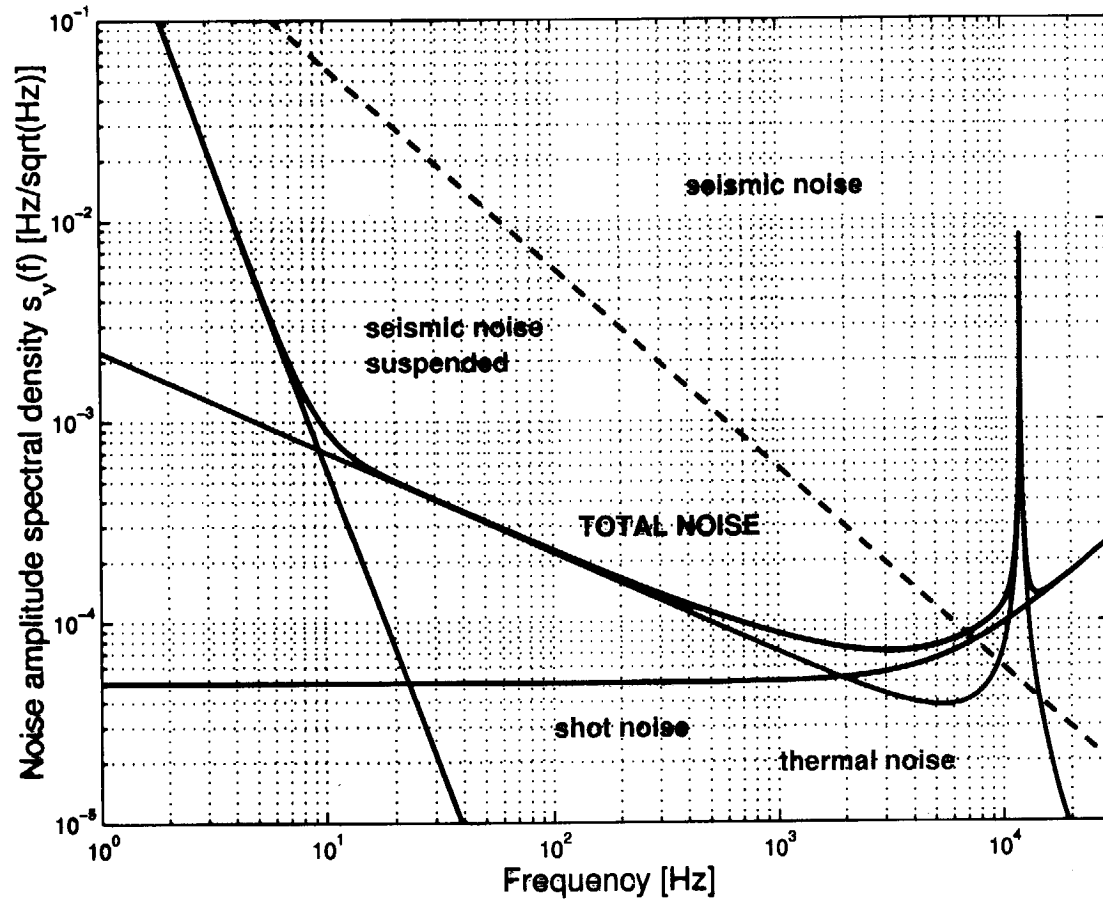
	50 Hz	300 Hz	1000 Hz
pre-stabilization loop	$2 \cdot 10^{-2}$	$1 \cdot 10^{-2}$	$1 \cdot 10^{-2}$
Power recycling cavity	$2 \cdot 10^{-4}$	$3 \cdot 10^{-4}$	$9 \cdot 10^{-2}$
beamsplitter	$5 \cdot 10^{-5}$	$1.6 \cdot 10^{-5}$	$9 \cdot 10^{-6}$

**1200 armlength**  
**asymetrie  $1 \cdot 10^{-4}$  due to Schnupp-Modulation**

# FREQUENZRAUSCHEN



# FREQUENCY NOISE OF THE GEO600 ULE CAVITY



$$Q_{\text{cavity}} = 30000$$

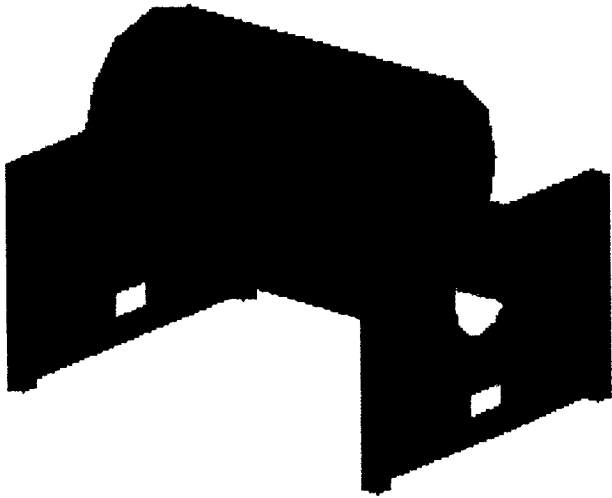
$$f_0^{\text{long}} = 12 \text{ kHz}$$

$$P_{\text{opt}} = 1 \text{ mW}$$

$$f_{\text{pend}} = 1 \text{ Hz}$$

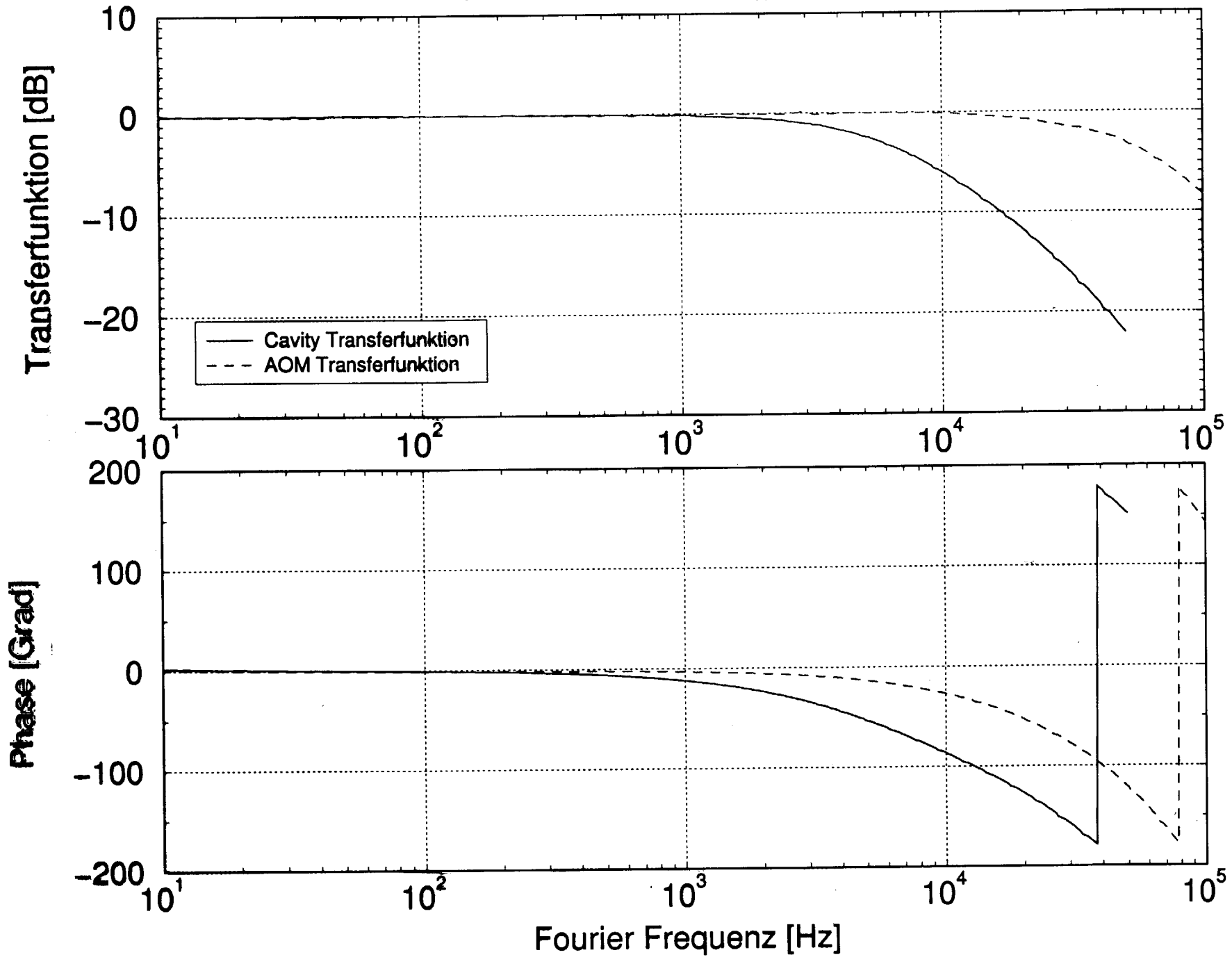


# ULE reference cavity

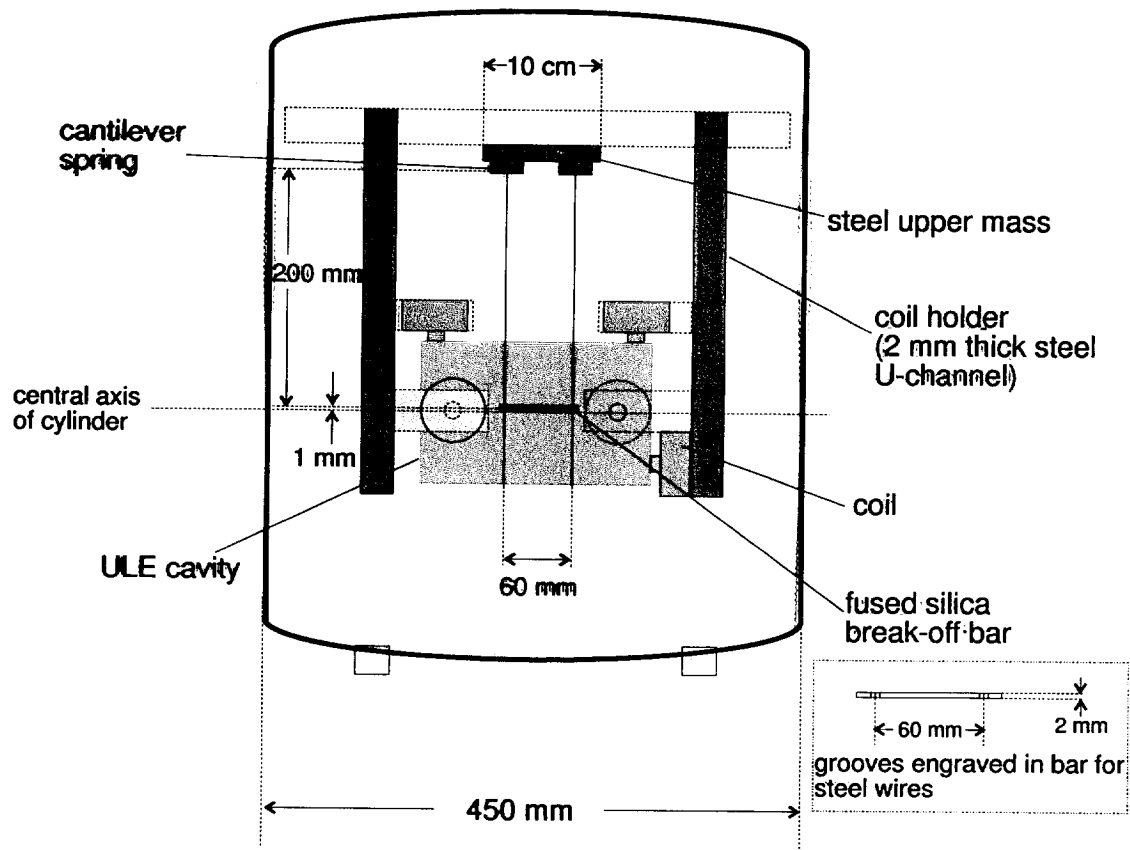


- ULE spacer and prism
- ULE mirrors optical contacted
- linewidth 14 kHz
- Finesse  $F \sim 50.000$
- FSR 700 MHz

s-pol, Finesse 58000, pole<sub>3dB</sub>@6.04kHz



# SUSPENSION OF THE REFERENCE CAVITY



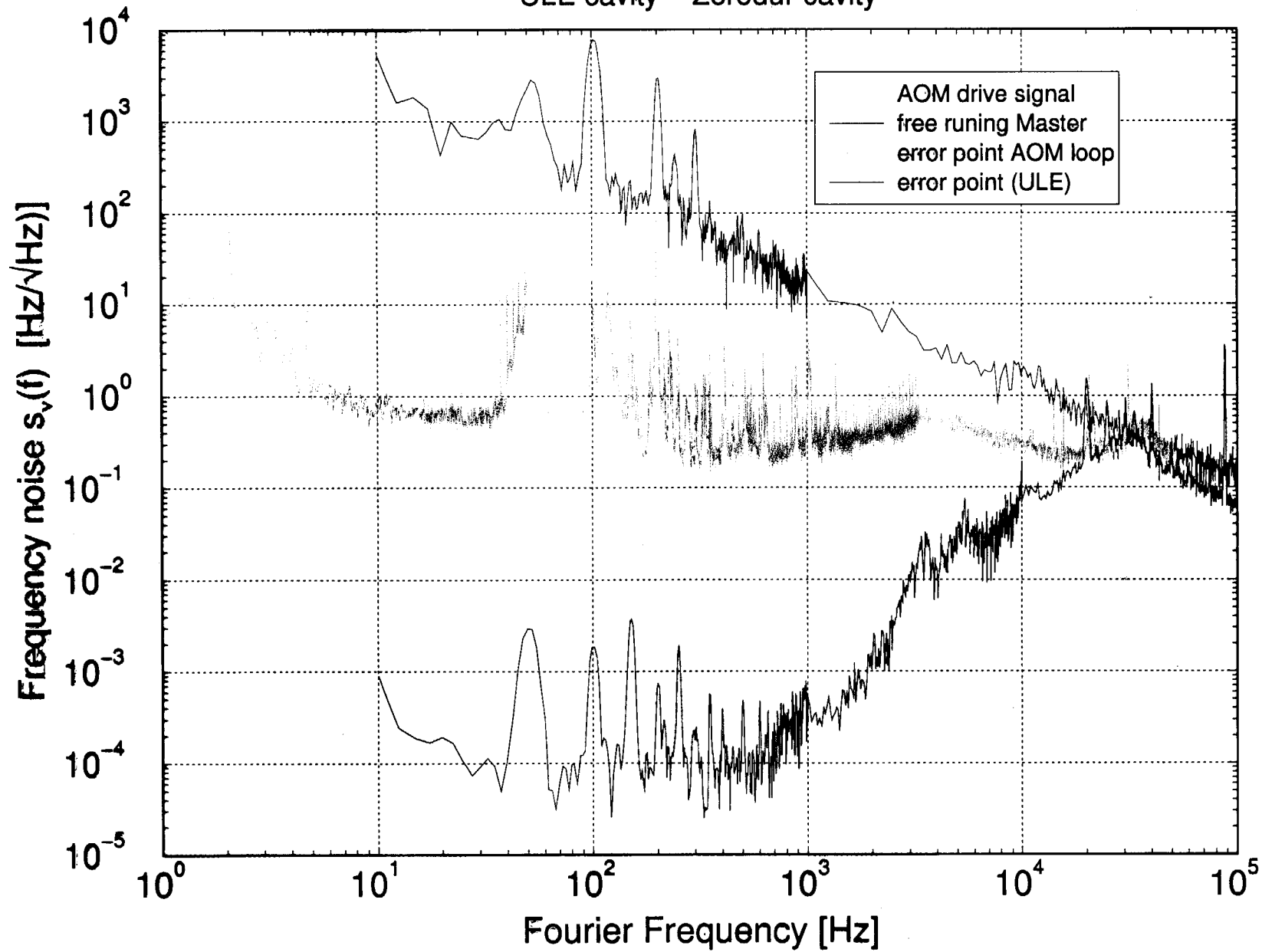
Schematic of ULE cavity suspension  
view perpendicular to optic axis

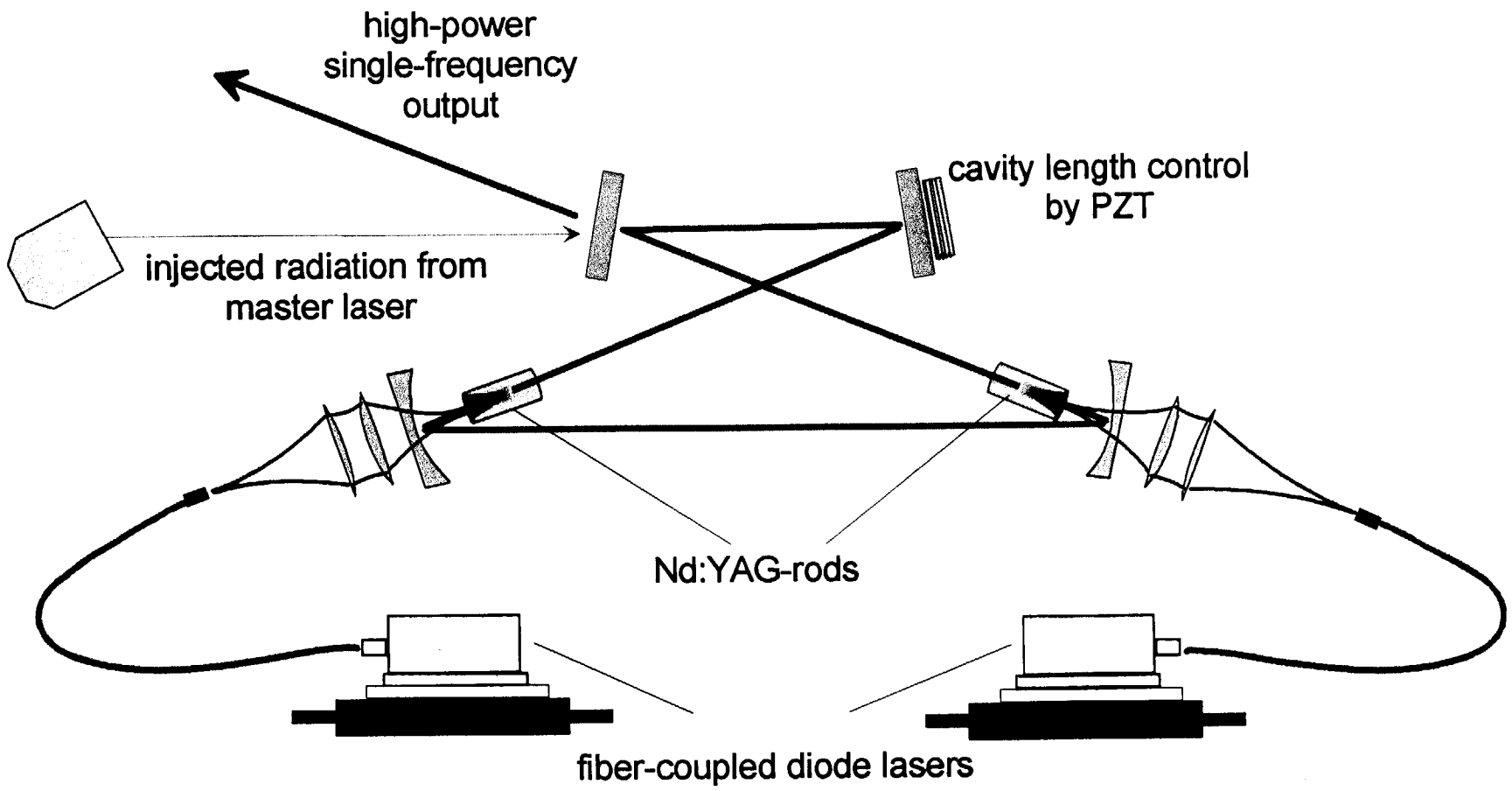
(approx. to scale)

[M.Plissi]

# Relative Frequency Noise

ULE cavity - Zerodur cavity





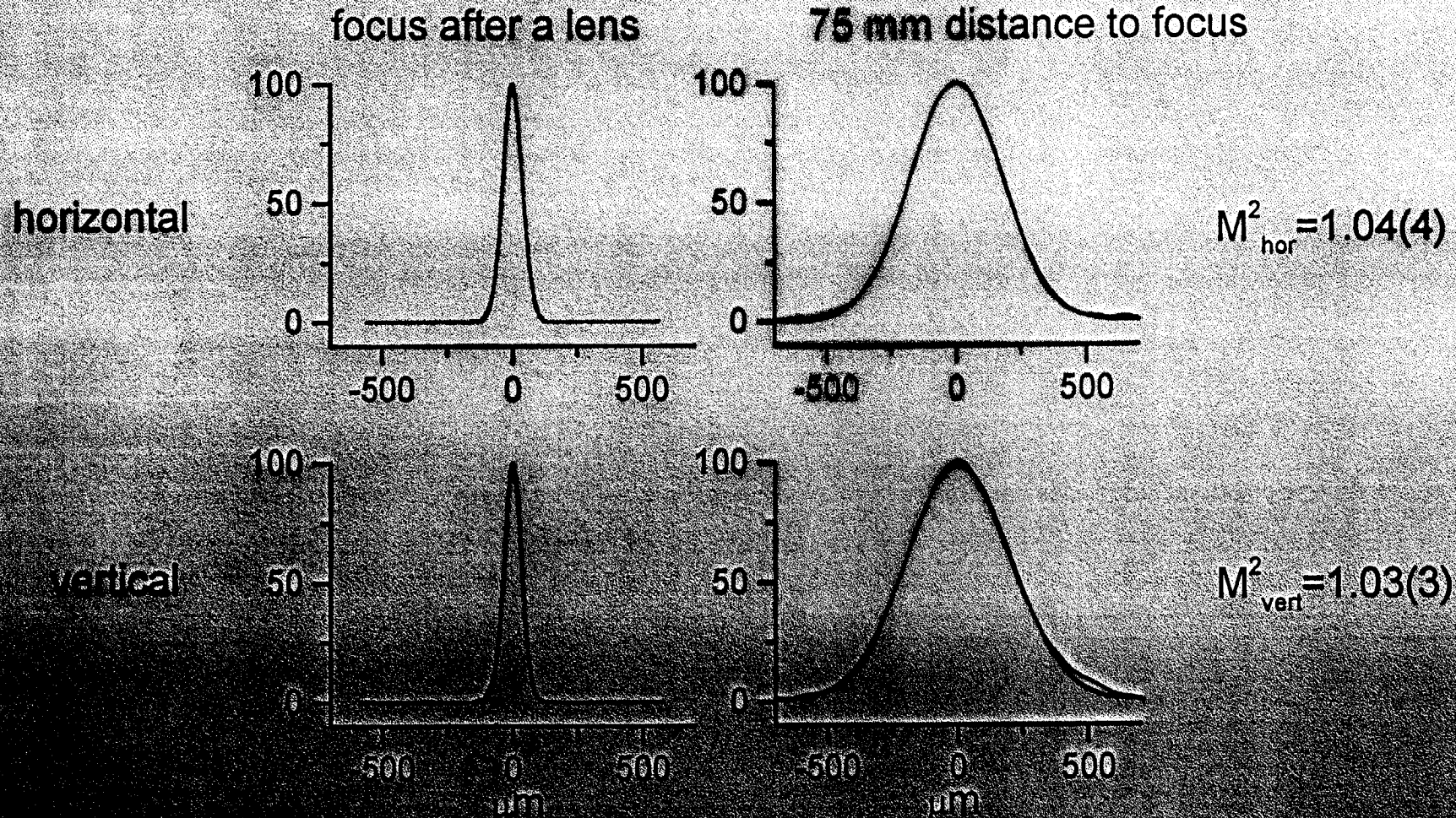
I. Zawischa

© LZH

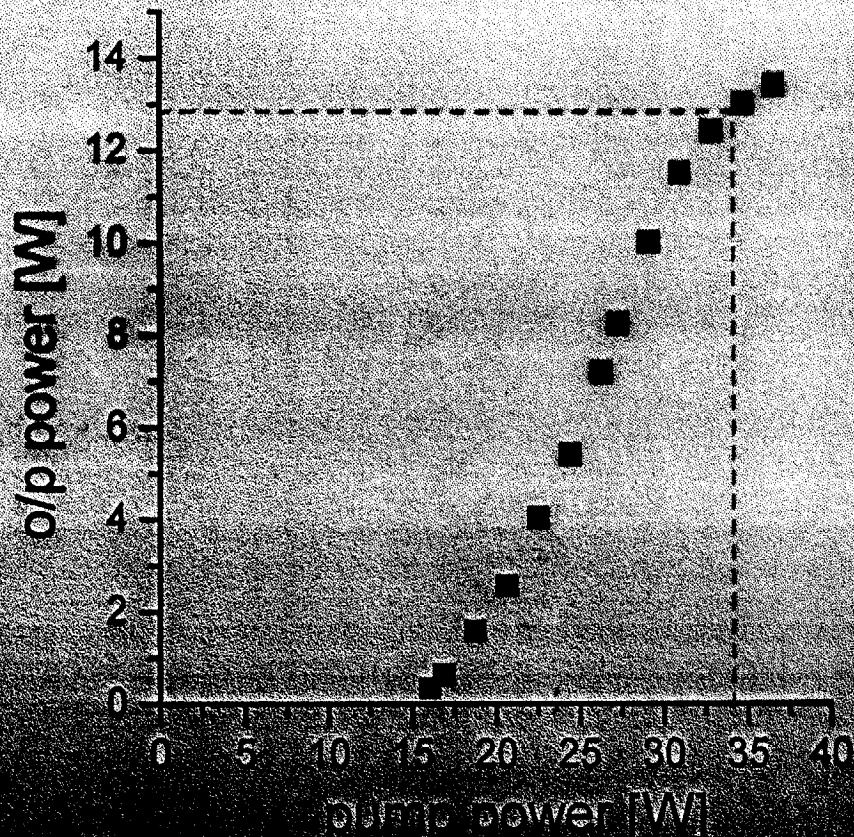
# High Power End-pumped Ring Laser



# Laser for GEO600: Properties of the Slave



# Laser for GEO600: Properties of the Slave



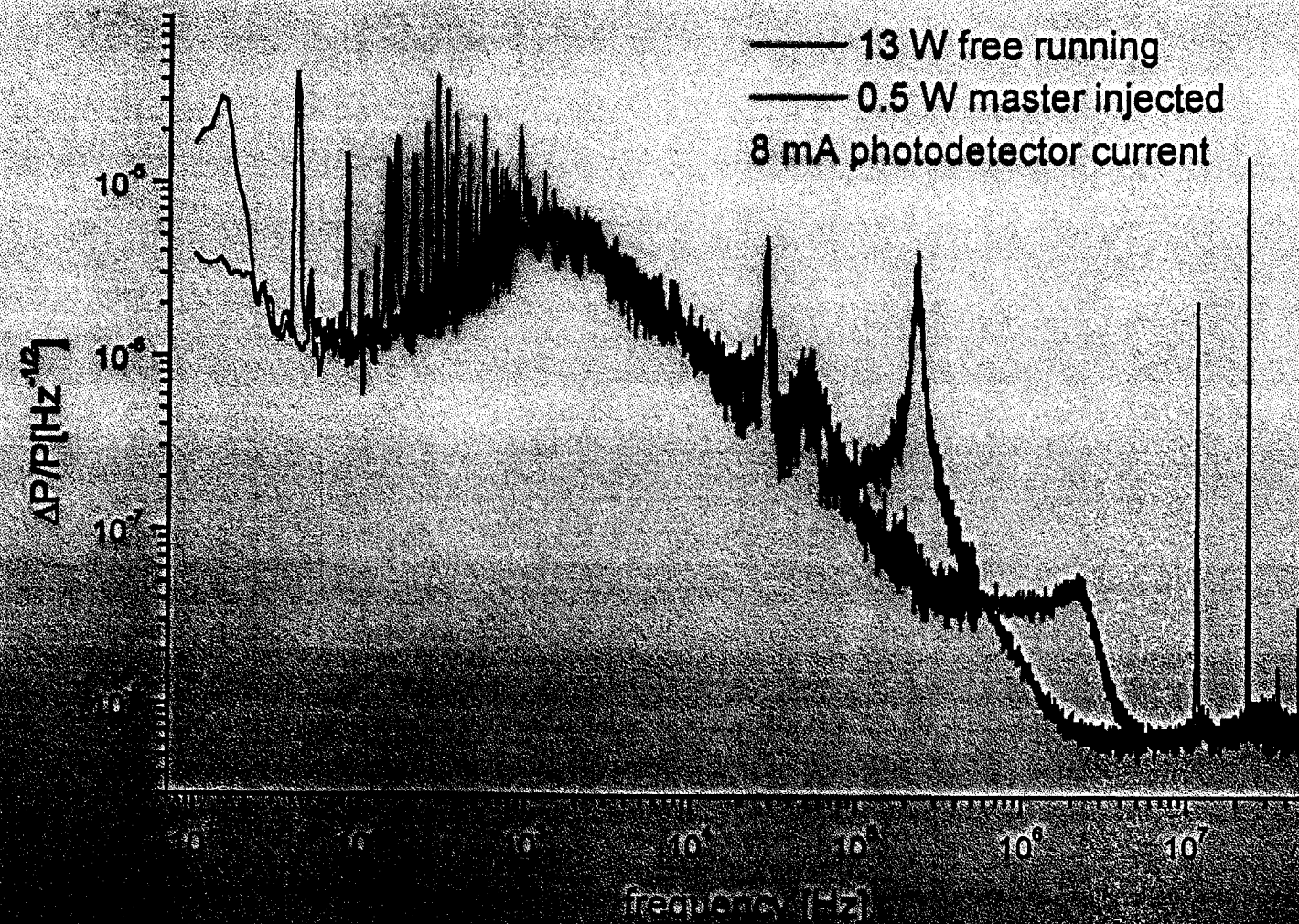
degree of polarization  
99%

state of polarization  
99% linear horizontal

output beam waist  
horizontal 280 $\mu$ m  
vertical 310 $\mu$ m



# Laser for GEO600: Intensity Noise





# Injection Locked Ring Laser: AM Transfer

$$T = (dP_{out} / P_{out}) / (dP_{in} / P_{in}) \quad P_{master} = 0.25 \text{ W}; P_{out} = 9.5 \text{ W}$$

