

Nd:YVO₄ Amplifier System

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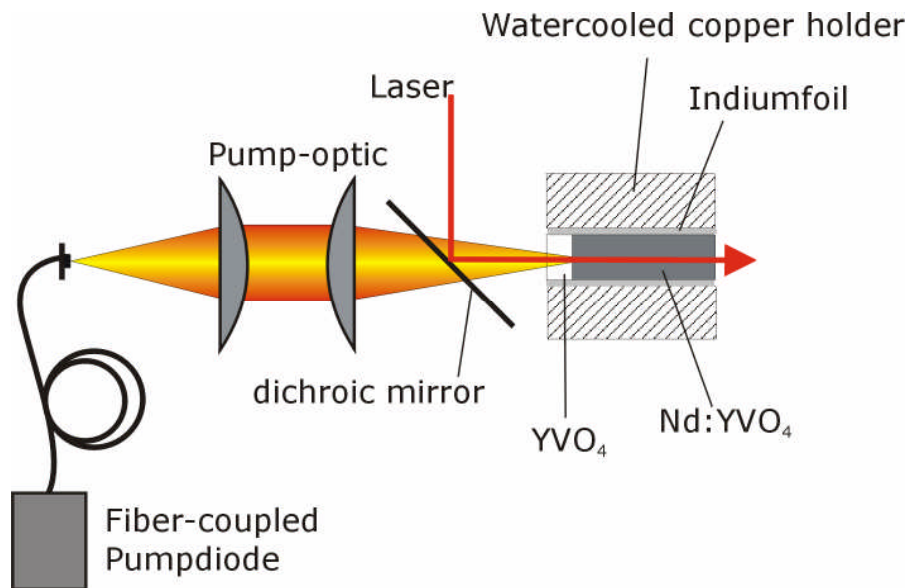
Frank Seifert, Patrick Kwee and Benno Willke
AEI

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Outline

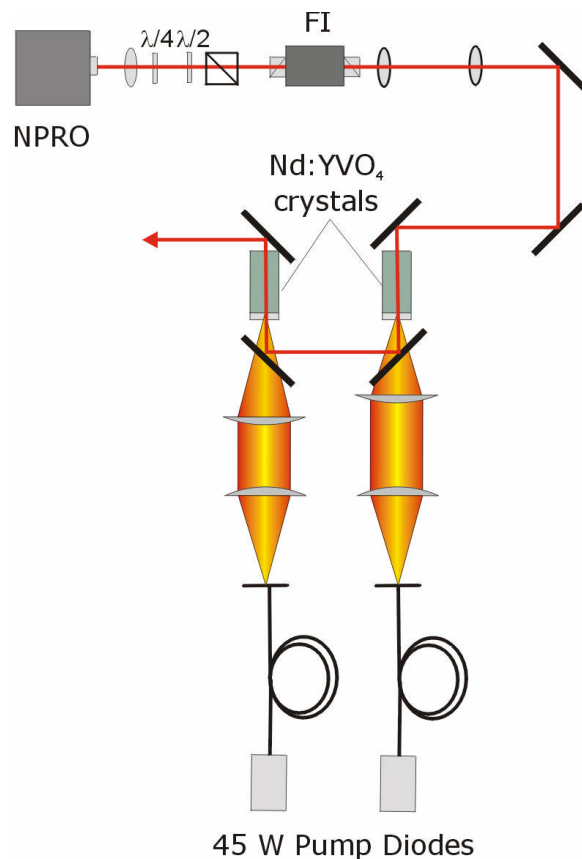
- Single Amplifier stage design
- Amplifier Setup with 2 stages
- 4 Amplifier stages
- Summary and Outlook

Single amplifier stage design



- Gain medium:
3x3x10 mm³ Nd:YVO₄
8 mm 0.3 % dop.
2 mm undoped end cap
naturally birefringent
- Pumpdiodes:
fiber-coupled
808 nm, 45 W
400 μm fiber diameter
NA=0,22

Amplifier Setup with 2 stages



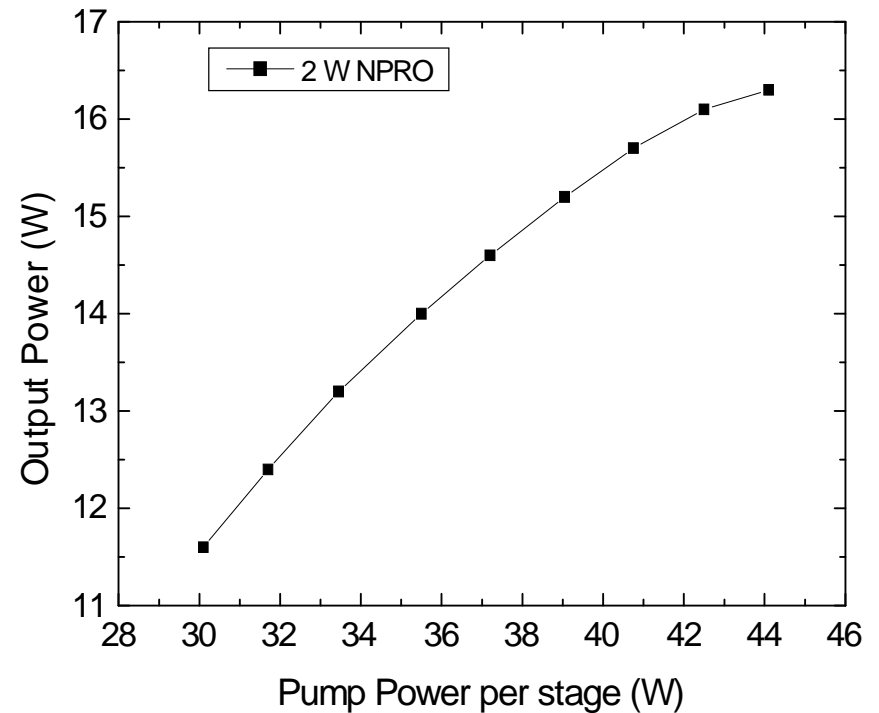
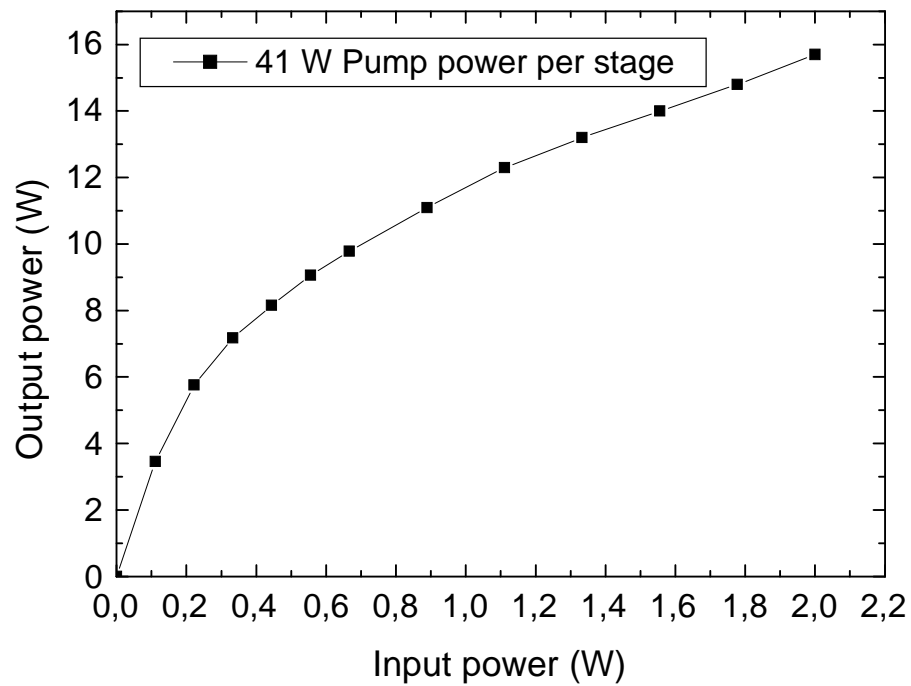
Master Laser:

2 W NPRO (Innolight Mephisto)

600 μm pumpspot diameter in
first crystal

800 μm in second crystal

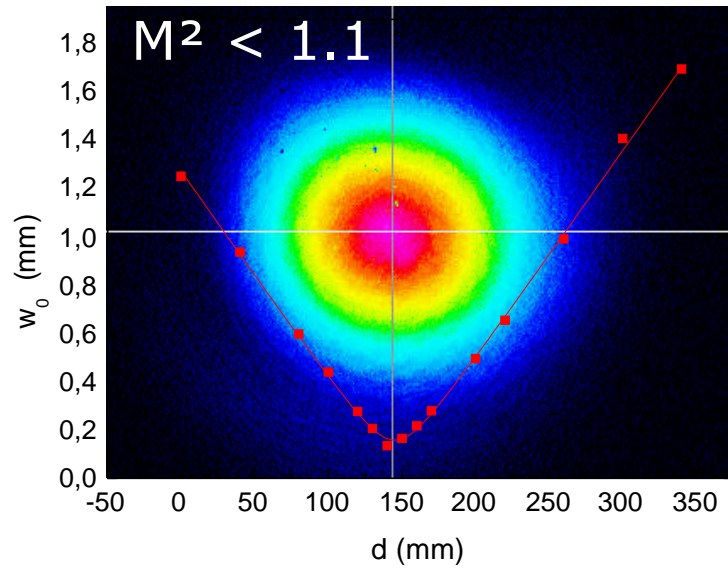
Amplification with 2 stages



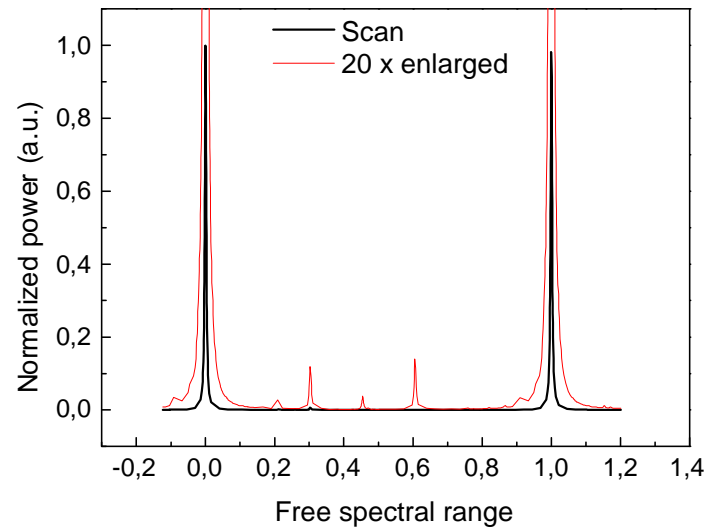
2 W NPRO amplified to 15,7 W

Beamquality of 2 staged Amplifier

Beamprofile and M^2 -Measurement

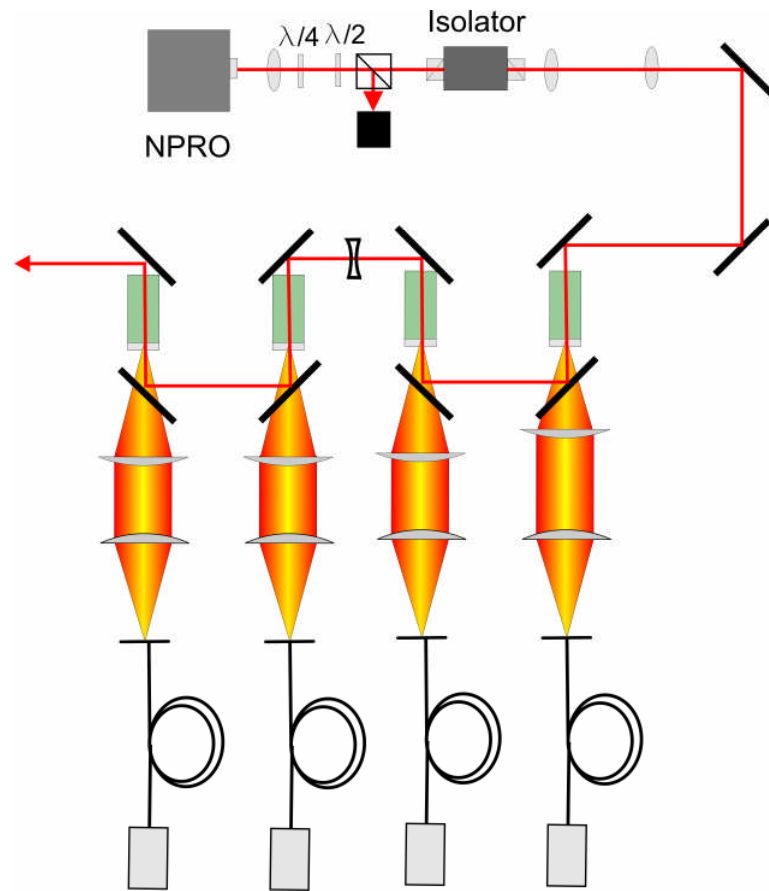


Pre-mode-Cleaner measurement



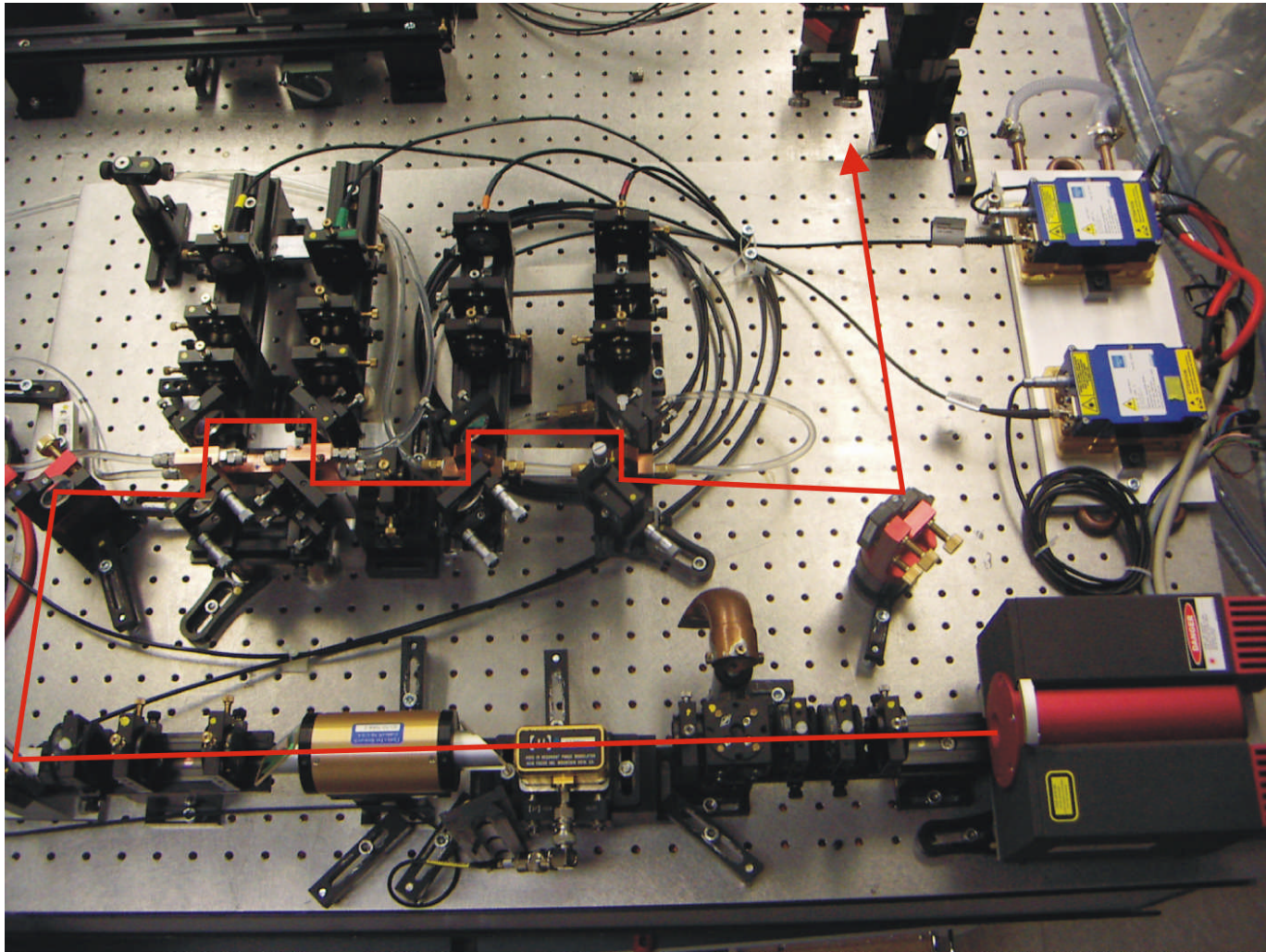
Power in fundamental mode >97%

4 Amplifier Stages

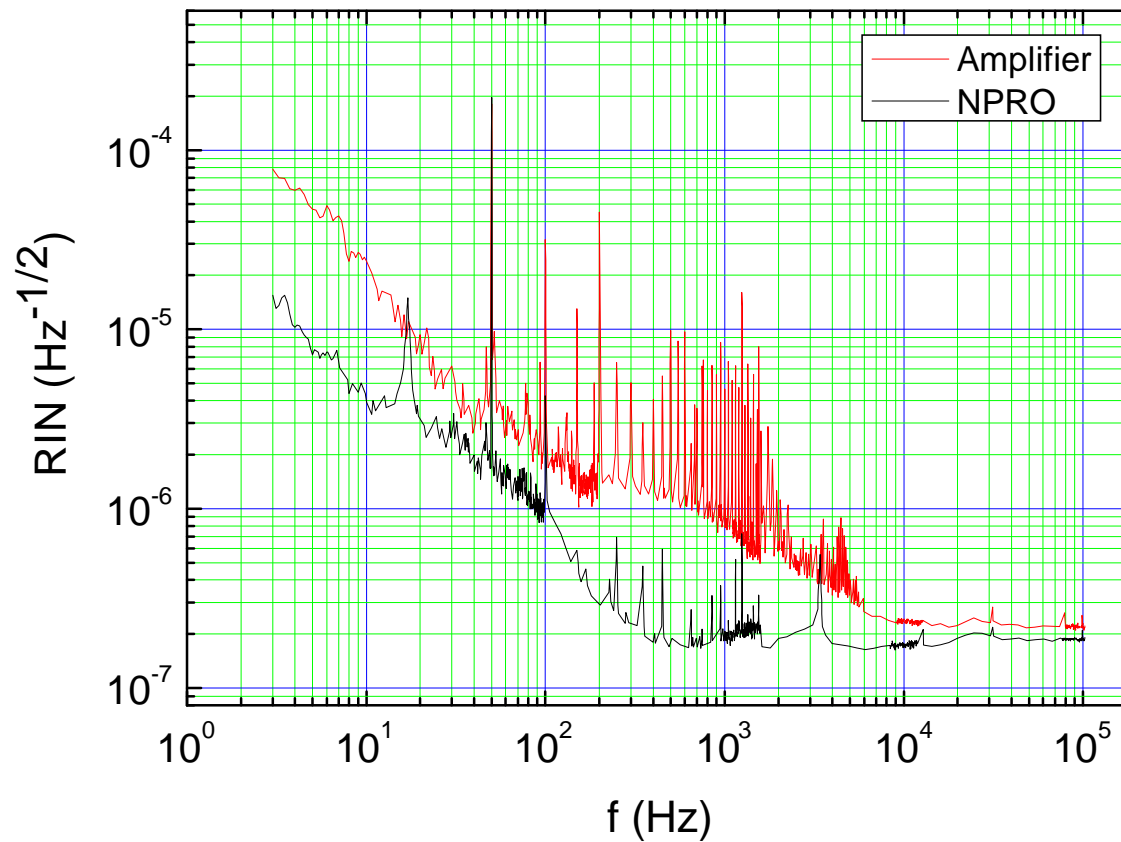


- 2 W NPRO
- 40 W Pump Power / stage
- 32 W Output power
 - $M^2 < 1,1$
 - 95% power in fundamental
- Maximum output power 35 W

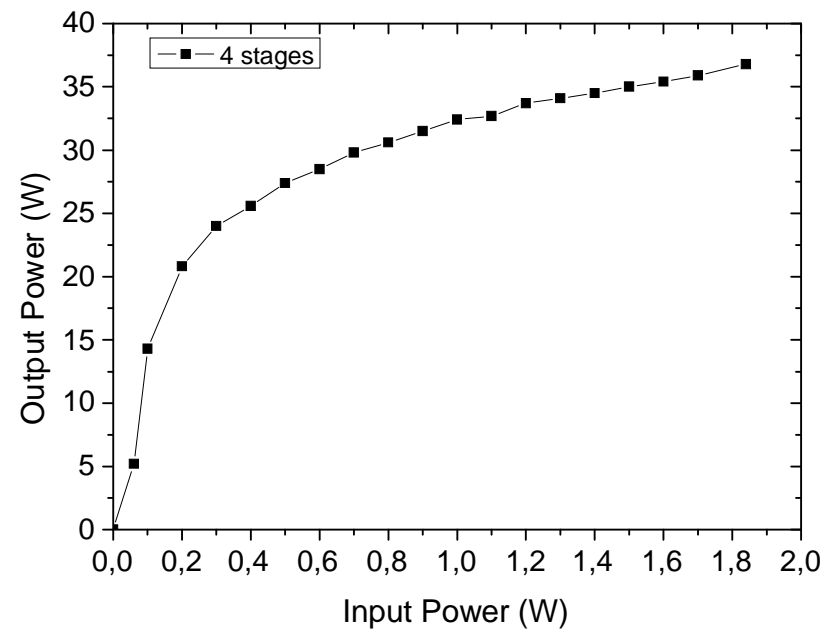
4 Amplifier Stages



Intensity Noise of Unstabilized Amplifier System



Input Power Variation of 4 staged Amplifier System



Summary and Outlook

- End-pumped cascadable amplifier system
- Amplification of a 2 W NPRO:
 - 2 stages amplified to 15.7 W with 97% power in fundamental mode
 - with 4 stages to 32 W with 95% power in fundamental mode
- Possible laser source for LIGO+

PEOPLE MATTER

*Forschung
Entwicklung
Beratung*

 **LASER ZENTRUM HANNOVER e.V.**



Thank you for your attention !