Modeling of Rare Earth Doped Mid-IR Fiber Lasers

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Mid-IR optical sources

Many molecules of interest, such as CO_2 and CH_4, present fundamental vibrational absorptions in the mid-IR region of the electromagnetic spectrum

Need for compact, cheap, high-efficiency and reliable optical sources

Remote sensing, molecular spectroscopy, optical free propagation, environmental monitoring, imaging and biomedical applications

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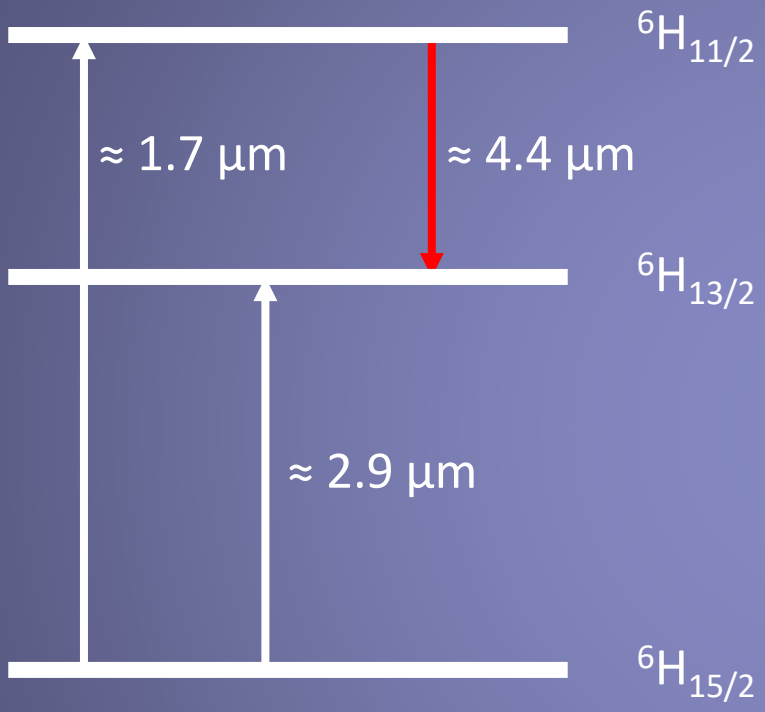
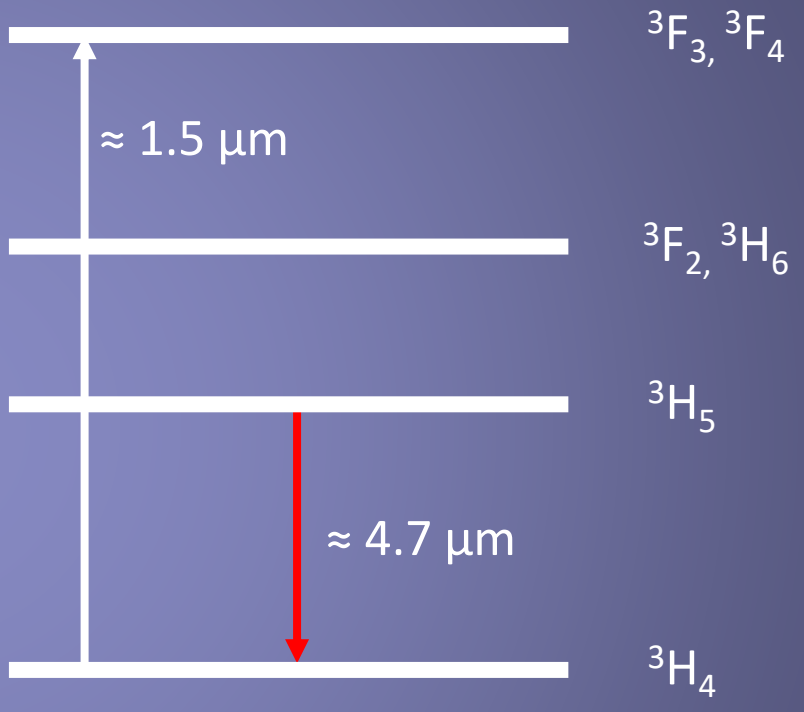
Rare Earths suitable for Mid-IR emission



Dy^{3+}



Pr^{3+}

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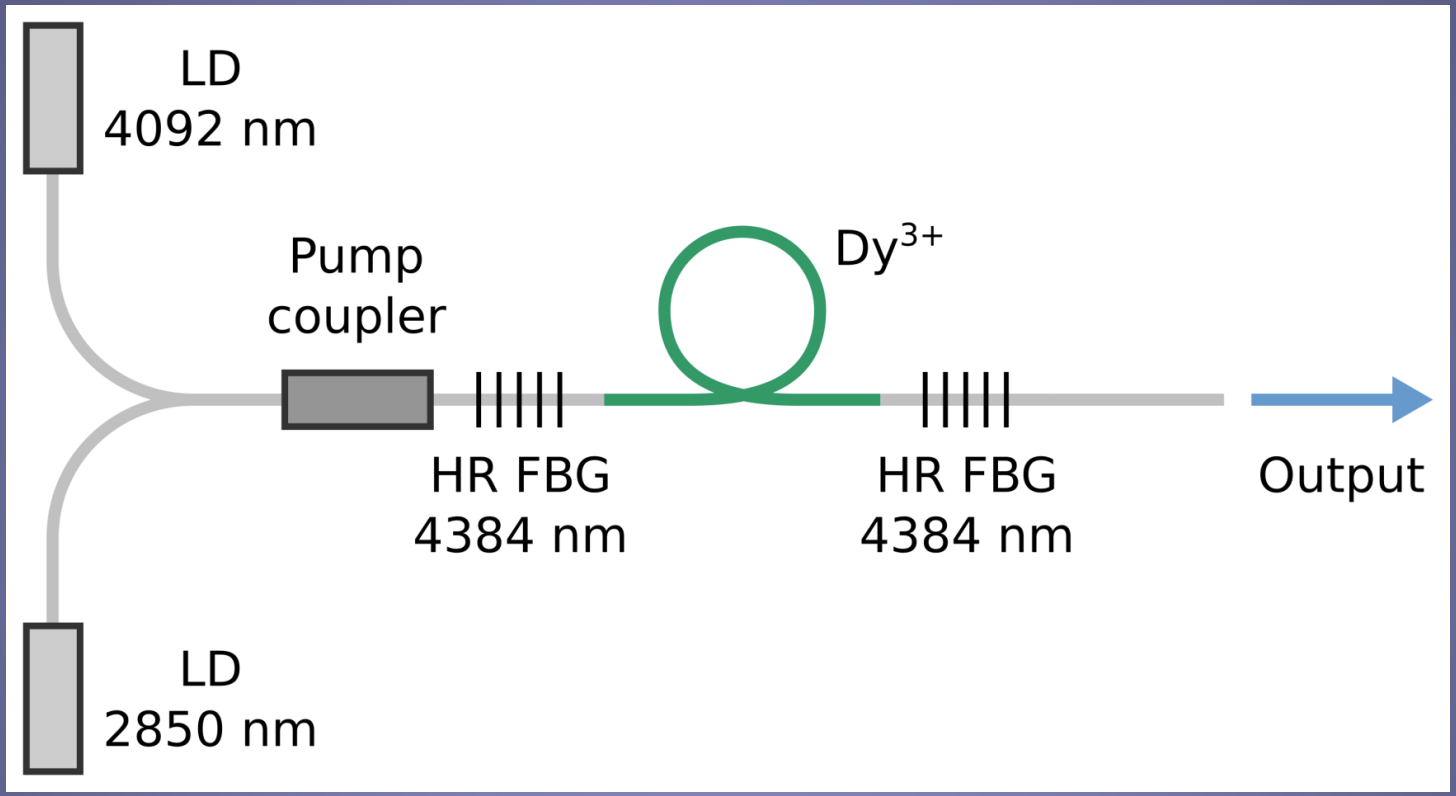
Double Pump Dy^{3+} Fiber Laser



M. C. Falconi, G. Palma, F. Starecki, V. Nazabal, J. Troles, S. Taccheo, M. Ferrari, and F. Prudenzano, "Design of an Efficient Pumping Scheme for Mid-IR Dy3+:Ga5Ge20Sb10S65 PCF Fiber Laser," Photonics Technology Letters, IEEE, vol. 28, no. 18, pp. 1984–1987, Sep 2016

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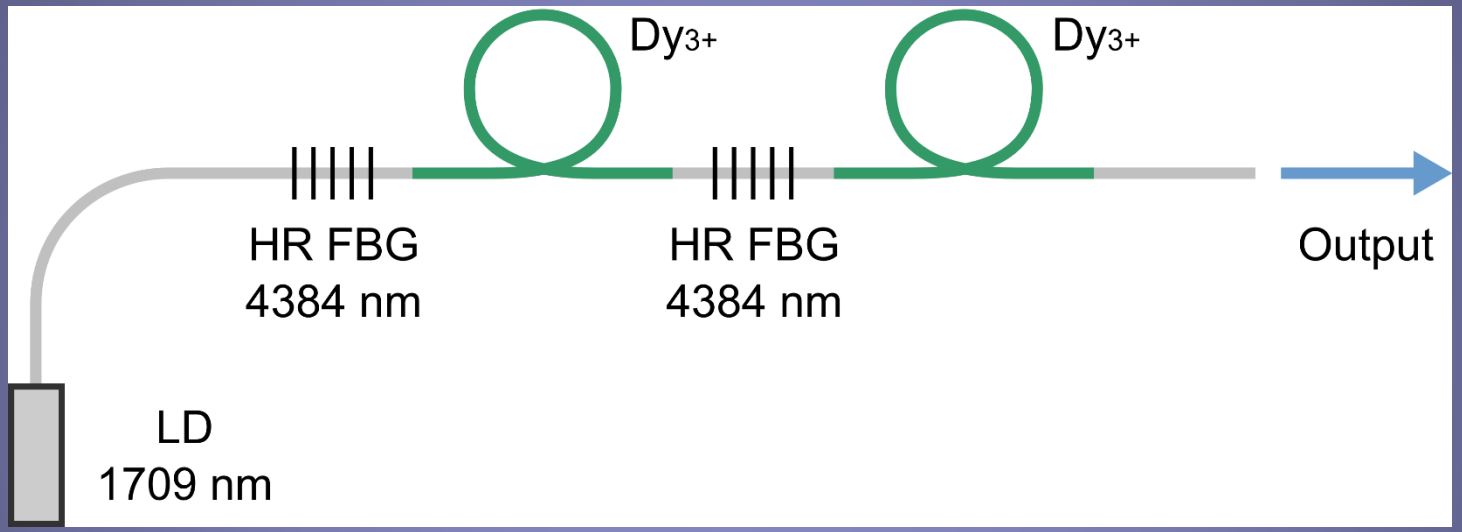
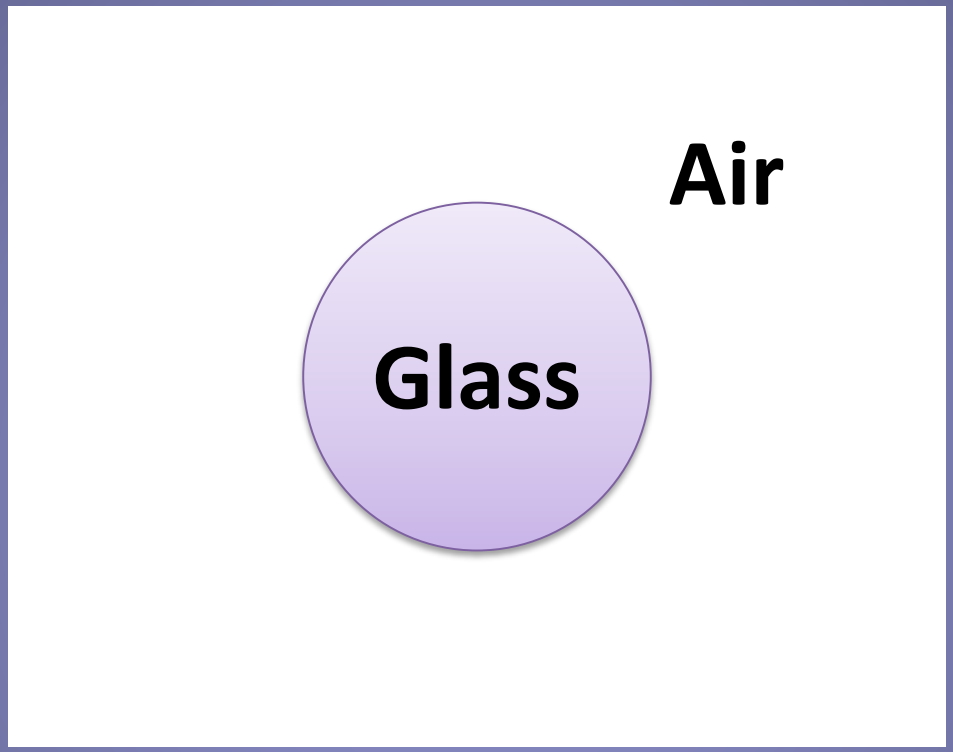
Dy^{3+} Fiber Laser in MOPA Configuration



Work currently under review

Toward a proof of concept… (1/3)



- Single index fiber doped with Dy^{3+} ions
- Optical feedback provided by Fresnel reflection
- QCLs employed for pumping

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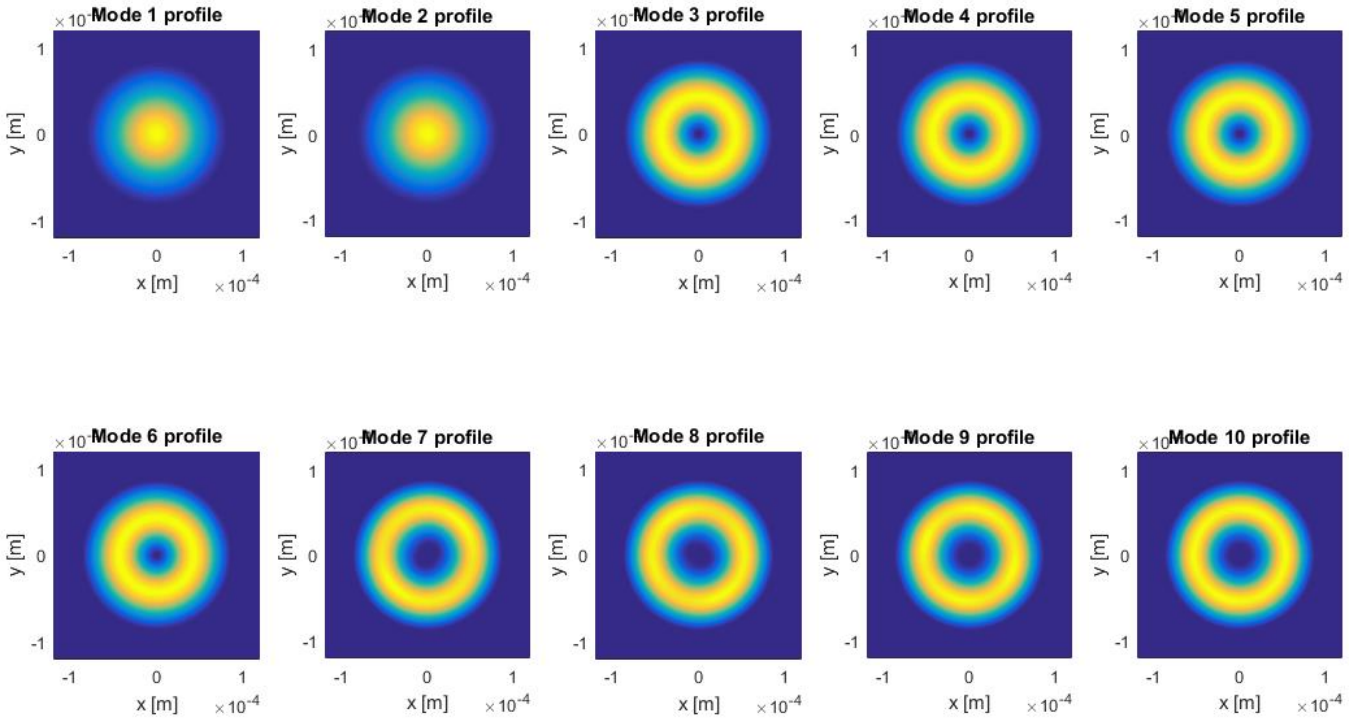
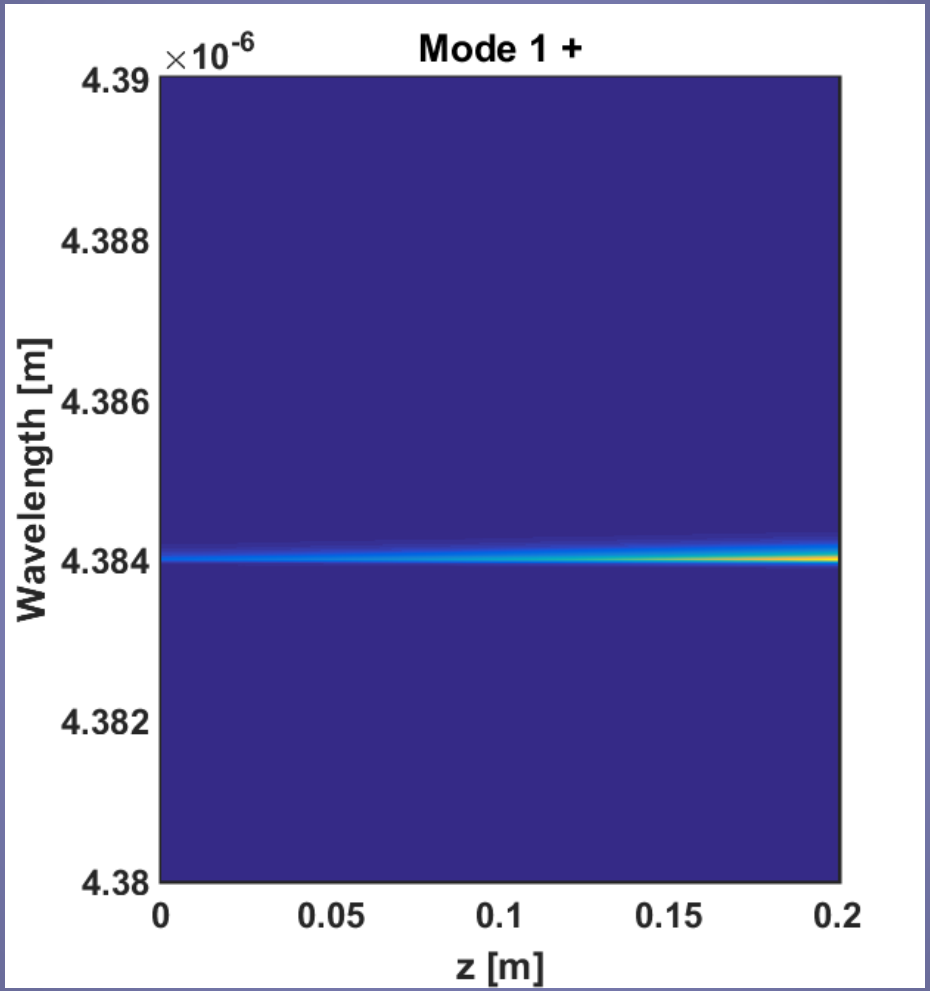
Toward a proof of concept… (2/3)



Toward a proof of concept… (3/3)



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Thank you for your attention!

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