Researchers develop high-efficiency mid- and long-wave optical parametric oscillator pump source

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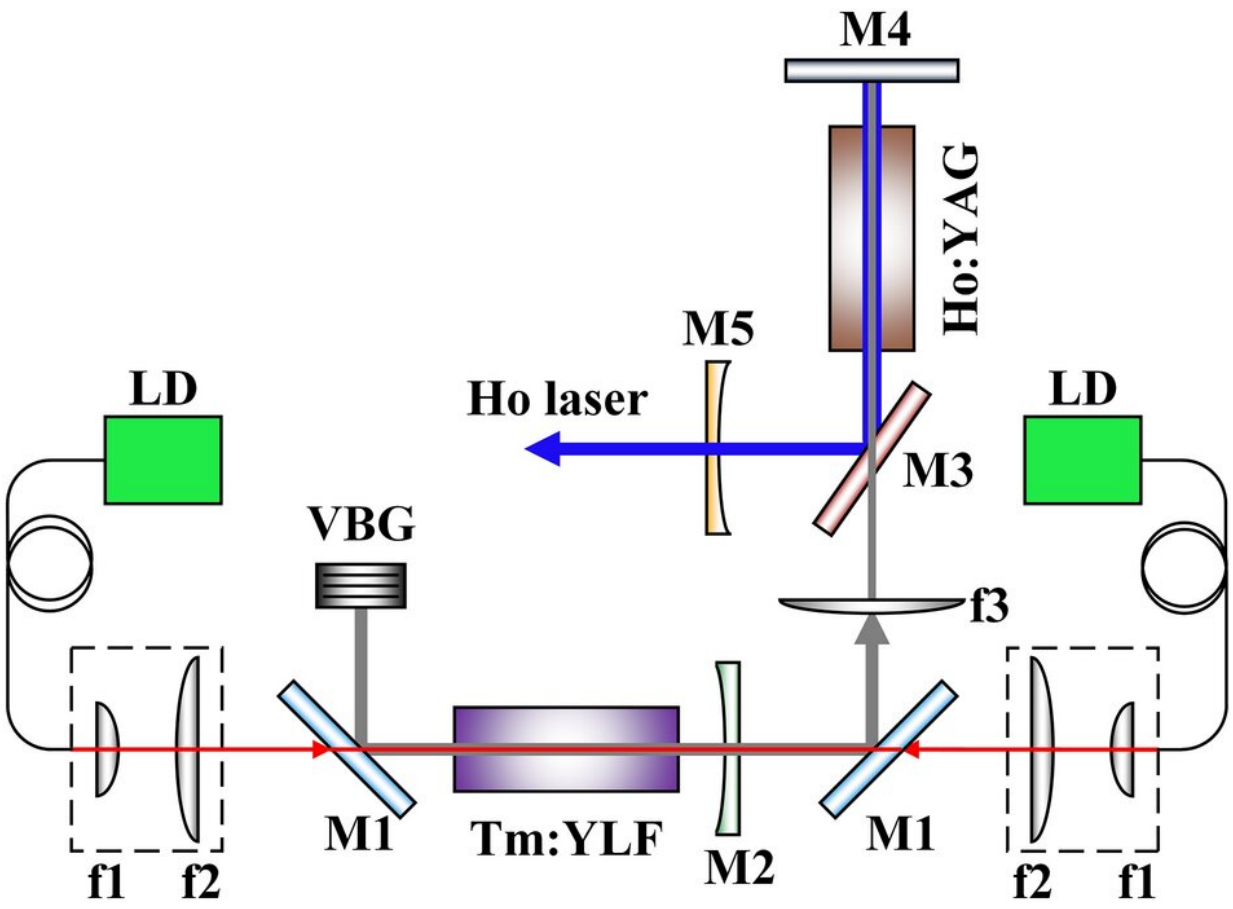

Experimental setup of the Ho:YAG laser pumped by Tm:YLF laser. Credit: *Scientific Reports* (2023). DOI: 10.1038/s41598-023-27970-0

Widely tunable mid- and long-wave infrared (8–12 μm) lasers are located in the atmospheric window range and the human eye safety range. They are widely applied in the field of Lidar.

A research team from the Aerospace Information Research Institute (AIR) of the Chinese Academy of Sciences (CAS) has developed a high-efficiency mid- and long-wave optical parametric oscillator pump source: the Ho:YAG laser, which achieves high-efficiency 2.1 μm laser output by scanning and optimizing the pump laser wavelength.

The study was published in *Scientific Reports* on Jan. 18.

A tunable Tm:YLF laser is the pump source of the Ho:YAG laser. According to the temperature tuning characteristics of volume Bragg grating (VBG), the wavelength of Tm:YLF laser's continuous tunability ranges from 1906.04 to 1908.83 nm, corresponding to a linewidth of less than 0.41 nm.

By scanning and optimizing the wavelength of the pump light, the Ho:YAG laser output with a light-to-light conversion efficiency of 59.12% and a slope efficiency of 68.26% was achieved under the center wavelength of the pump source of 1907.36 nm.

They used the Ho:YAG laser as the pump source of $ZnGeP_2$ optical parametric oscillator (ZGP-OPO) and obtained a high-efficiency tunable long-wave infrared laser under type I phase matching, with a tuning range of 8.02–9.15 μm.

More information: Juntao Tian et al, Ho:YAG laser at 2097 nm pumped by a narrow linewidth tunable 1.91 μm laser, *Scientific Reports* (2023). DOI: 10.1038/s41598-023-27970-0