

Far-infrared laser

From Wikipedia, the free encyclopedia

Far-infrared laser or **terahertz laser** (**FIR laser**, **THz laser**) is a laser with output wavelength in between 30-1000 μm (frequency 0.3-10 THz), in the far infrared or terahertz frequency band of the electromagnetic spectrum.

FIR lasers have application in terahertz spectroscopy, terahertz imaging as well in fusion plasma physics diagnostics. They can be used to detect explosives and chemical warfare agents, by the means of infrared spectroscopy or to evaluate the plasma densities by the means of interferometry techniques.

FIR lasers typically consist of a long (1–3 meters) waveguide filled with gaseous organic molecules, optically pumped or via HV discharge. They are highly inefficient, often require helium cooling, high magnetic fields, and/or are only line tunable. Efforts to develop smaller solid-state alternatives are under way.

The p-Ge (p-type germanium) laser is a tunable, solid state, far infrared laser which has existed for over 25 years.^[1] It operates in crossed electric and magnetic fields at liquid helium temperatures. Wavelength selection can be achieved by changing the applied electric/magnetic fields or through the introduction of intracavity elements.

Quantum cascade laser (QCL) is a construction of such alternative. It is a solid-state semiconductor laser that can operate continuously with output power of over 100 mW and wavelength of 9.5 μm. A prototype was already demonstrated.^[2] and potential use shown.^[3]

Free electron lasers can also operate on far infrared wavelengths.

Femtosecond Ti:sapphire mode-locked lasers are also being used to generate very short pulses that can be optically rectified to produce a terahertz pulse.

See also

- List of plasma (physics) articles

References

- "Photo image on page 3" (<http://spie.org/x39922.xml>). Spie.org. Retrieved 2015-07-23.
- "Quantum Cascade Laser" (<http://dx.doi.org/10.1126/science.264.5158.553>). Dx.doi.org. 1994-04-22. Retrieved 2015-07-23.
- "Tiny infrared laser holds promise as weapon against terror" (<http://www.brightsurf.com/news/headlines/view.article.php?ArticleID=20538>). Brightsurf.com. Retrieved 2015-07-23.

Retrieved from "https://en.wikipedia.org/w/index.php?title=Far-infrared_laser&oldid=672768218"

Categories: Terahertz technology | Laser types | Electronics stubs

-
- This page was last modified on 23 July 2015, at 18:51.
 - Text is available under the Creative Commons Attribution-ShareAlike License; additional terms may apply. By using this site, you agree to the Terms of Use and Privacy Policy. Wikipedia® is a registered trademark of the Wikimedia Foundation, Inc., a non-profit organization.