

# Classification and functions of lasers essay sample

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## **Introduction**

Evolution of technology relating to light brought about the laser science or laser physics. This physics of laser is a branch of optics which describes the main theory and practices of lasers. This science is majorly related to the quantum electronics, laser construction, optical cavity design, and e. t. c. There are various types or classifications which are based on the either the lasing medium, duration of laser emission, and hazards based. The of laser is based generally on the principle of adding energy to atoms or molecules so as to make it have a high - energy state, a term known as population inversion(Garwin & Lincoln).

## **Classification and functions**

A broad classification can be based on; gas discharge lasers, semiconductor diode lasers, optically pumped lasers and other (which include the chemical lasers, gas-dynamics lasers, x-ray lasers, combustion lasers). Classification according to lasing medium: solid state lasers, gas lasers, excimer lasers, dye lasers, or semiconductor lasers (Oregon State University).

- Solid state lasers are those lasers with their materials being distributed in a solid matrix. Ruby, fibers and Yttrium aluminum garnet lasers are types.

These lasers emit their light at 1. 064 micrometers.

- Fiber lasers are the type of solid laser group. The intensity is more than the CO<sub>2</sub> lasers. It's generally used for metal marking via annealing or for metal engraving. It is also used for high-contrast plastic marking.

- Gas lasers are those types that emit their light at 10. 6 micrometers with a primary output of a visible red light. They are the types used in the cutting of

hard materials. Example includes the helium lasers and CO<sub>2</sub> lasers. CO<sub>2</sub> lasers which is an example of gas lasers are based on carbon dioxide gas mixtures. They are used mainly for working on non-metallic materials and plastics. This type has high efficiency with a very good beam quality.

- Eximer lasers are somewhat different since they use a form of reactive gases that are mixed (such as chlorine and fluorine mixed with argon or xenon) to create the needed laser material. It is the post-stimulation of the materials that dimer is produced, lased to create the required light in the ultraviolet range to create the lasers.

**Classifications based on laser emission are: Continuous wave lasers, single pulsed, single pulsed Q switched, repetitively pulsed, mode locked.**

- Continuous wave laser are the types that operate with a stable average beam power (Oregon State University). The problem with these lasers is that the power level is fixed based on design but performance over time affects it's and subsequently degrades the lasers.

- Single pulsed types are those with pulse durations of a few hundred microseconds to a few milliseconds.

- Single pulsed Q switched is the type with intracavity delay which helps the laser to store maximum energy but emission still occurs in a single pulse.

- Hazard based classifications are: Class 1, Class 1M, Class 2, Class 2M, Class 3R, Class 3b and Class 4.

The crystal lasers which have neodymium-doped yttrium aluminum garnet as a type. It can be used on working on metals, plastics and ceramics.

## Work Cited

Garwin, Laura & Lincol, Tim. The first laser; Charles H. Townes. A century of Nature. 2003. Web. 9 December, 2013 ([http://www.press.uchicago.edu/Misc/Chicago/284158\\_townes.html](http://www.press.uchicago.edu/Misc/Chicago/284158_townes.html)).

Melles Griat. Introduction to laser technology. Types of Lasers. Web. 9 December, 2013. ([www.cvimellesgriot.com](http://www.cvimellesgriot.com)).

Oregon State University. Types of lasers. Laser types and Classification. Environmental Health and safety. 2013. Web. 9 December, 2013. (<http://oregonstate.edu/ehs/laser/training/laser-types-and-classification>).