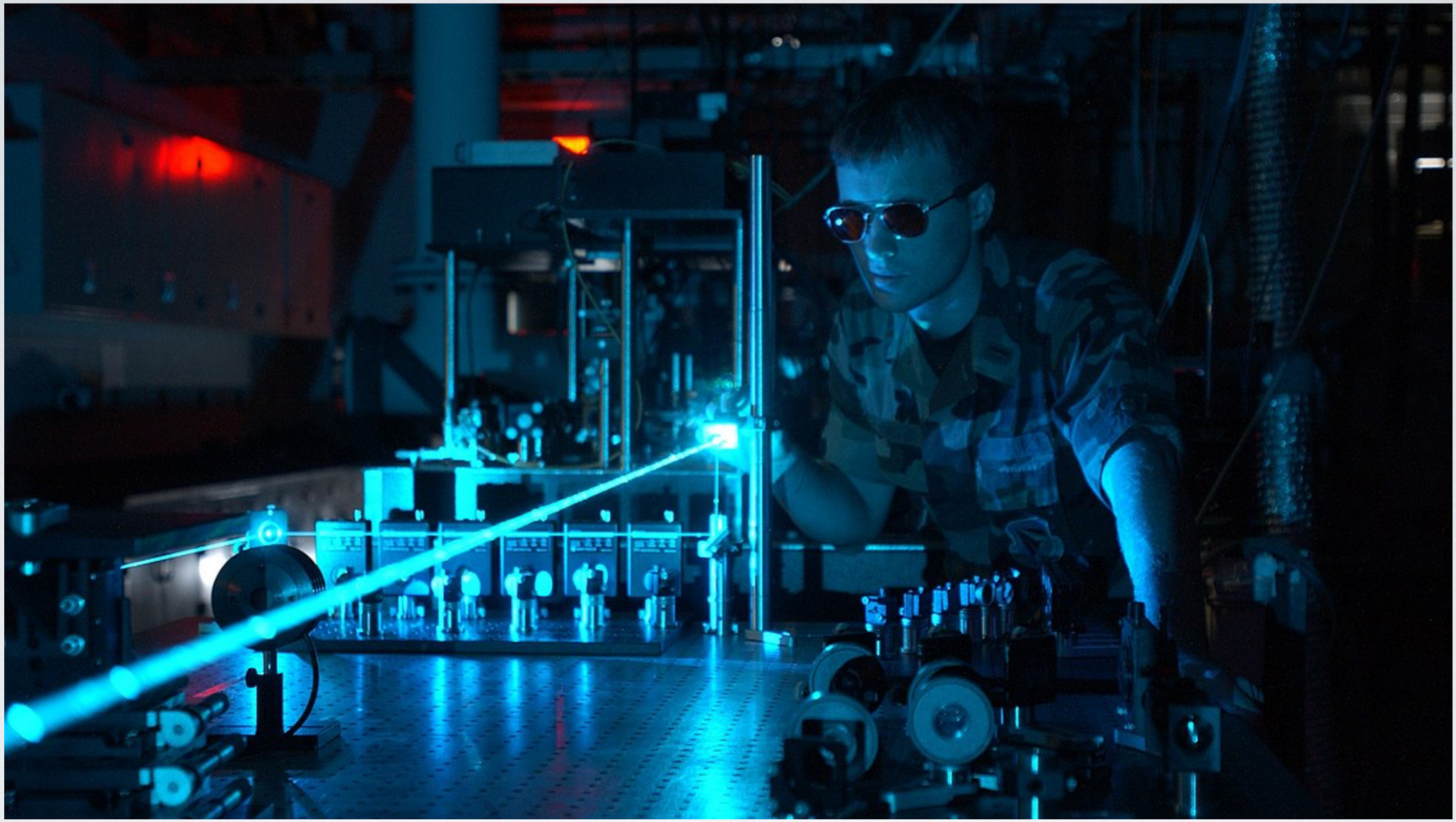
LASER

A simulation



LASERS

We need three things for a laser:

1) A gain medium

2) pump mechanism

3) Reflectors

First the pump

- The pump provides energy to the gain medium, and results in inversion of population which his essential for a laser to work.

- In the simulation, we use the pump to excite a percentage of the atoms in each round

THE GAIN MEDIUM

- The gain medium, should contain atoms, having a meta stable state with high half-life of around.
- We take input as the half life of the meta stable states. And based on the number of inverted atoms, a part of them spontaneously emit photons(and this is based on the half life value)

THE REFLECTORS

- Each round of the simulation is the time taken for light to travel through the gain medium. A part of the light is lost through the semi transparent mirror.

- We take as input the transparency of the mirror, and that part of the light goes out of the gain medium.

THE STIMULATED PART

- Each photon, which stimulates an excited atom, gives another photon, of same frequency and phase, and even direction.

- We maintain an array of photons in different directions and increase or decrease the number of photons based on gain of the medium, which in turn depends on the percentage of inverted populaticon.

SIMPLY.PY

- The simply.py file carries out all these basic operations, and gives the number of photons in the mirror. There are two loops so that you can vary one parameter, and see the effect it has on the output, graphically

- Note: you need python3 and matplotlib to run it (pip install marplot lib in linux/mac os) (pip is a terminal command)