



## Laser intensity continuous attenuation

ALATA Ivan (Aifan)

Laser Center of Université Paris Sud 11 / AECS Atomic Energy Commission of Syria

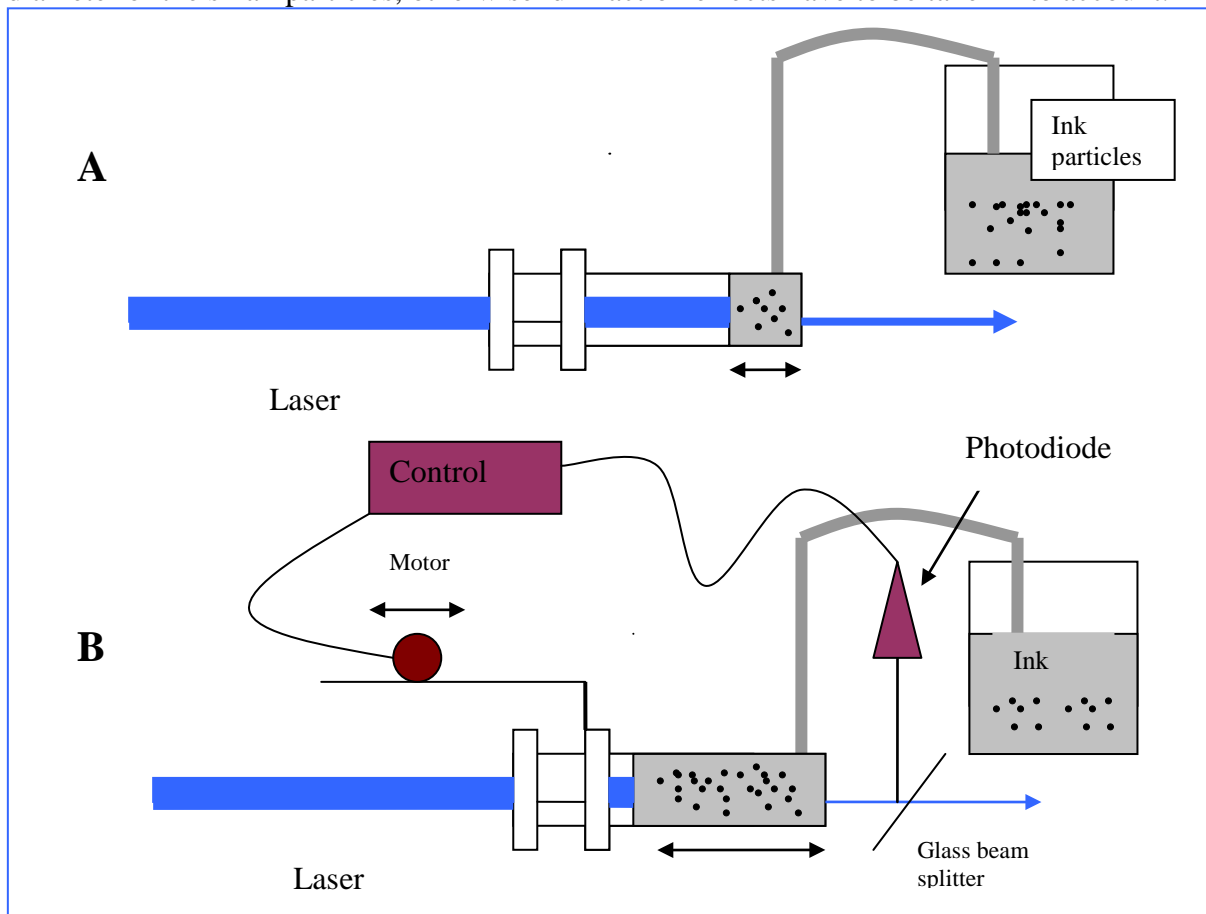
**Goal:** develop an continuous attenuator for a fixed power laser source to obtain different intensities or achieve fixed power from a laser source varying in time such as OPO's lasers. ([Optical Parametric Oscillators](#)).

**Basics :** this attenuator is based on absorption in an opaque liquid. In our case the liquid is obtained by dilution of small particles, each one of these behaving like a small “black body” enabling attenuation in a very large spectral domain. Black tint was used diluted in water Fig(1) A.

In order to control laser intensity, following Beer Lambert law, this may be done by two means :

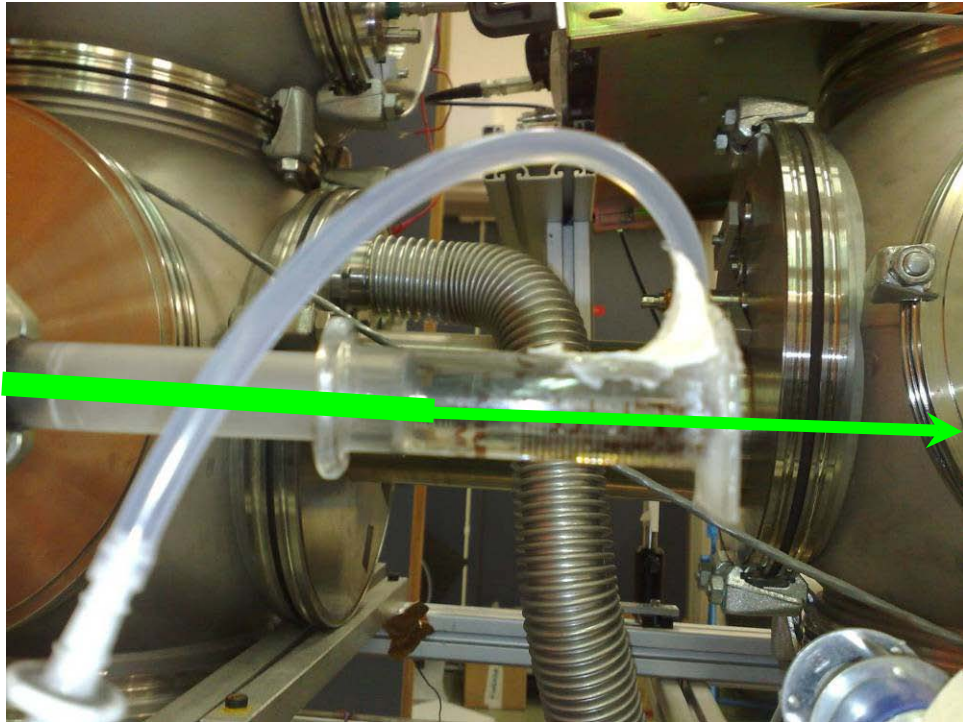
- 1- changing ink concentration.
- 2- Lowering or increasing the interaction length between laser beam and absorber which is the solution that was implemented here fig(1 and 2).

**Attention :** care should be taken that the laser beam diameter should be bigger than the diameter of the small particles, otherwise diffraction effects have to be taken into account.



Fig(1) : description of the experimental set up for the case of low absorption (A) and strong absorption (B)

We used a glass cylinder obtained by cutting the plunger side and gluing instead an optical window. In this cylinder we insert the absorbing liquid and the absorption length is adapted to the desired laser intensity by pushing or drawing the plunger. This set up may be refined by introducing an automatic actuation of the plunger controlled by the laser intensity measured by a photodiode ( Fig (1) B).



Fig(2): picture of the experimental set up.

It should be mentioned here that since this attenuator operates in a large spectral domain it is difficult to find its equivalent in commercial instruments.