MEASUREMENT EQUIPMENT FOR THE DETERMINATION OF LASER OUTPUT WAVELENGTH

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ABSTRACT

The measurement equipment,which we describe here,is used as an additional part of the output energy monitor. The figure illustrates the principle of the wavelength measurement using a well known narrow-band interference filter.The output energy of the laser,which is in our case a pulsed ruby laser,is E_o;part of the laser radiation reaches the energy monitors E_1 and E_2,after having passed the beamsplitters 1 and 2.The figure (right) shows the schema of the energy monitor.The laser beam passes through a gray-filter,an interference filter ($\Delta\lambda$ = 20 Å) ,and a lig tpipe and thereafter impinges on a photodiode.The electrical signal is the measured.
The calibration of E_1 and E_2 are carried out with a calorimeter (E_o).
In this case is

$E_1 = r_1 E_o T_1$ and $E_2 = r_2 E_o T_1$ (r = reflection factor of the beam-splitter)

If a small band interference filter ($\Delta\lambda$ = 1 Å) with a transmission $T_2 = a\cdot\lambda$ in the wavelength region of interest is introduced in front of the energy monitor E_2 ,one obtains

$$E_2 = r_2 E_o T_1 T_2 \quad .$$

The ratio of both values is

$$E_2/E_1 = r_2/r_1 \cdot T_2 = r_2/r_1\cdot a\cdot\lambda \quad \text{or} \quad \lambda = \text{const}\cdot E_2/E_1 \quad .$$

It is therefore possible to give directly the wavelength if a suitable choice of signal processing is carried out.
Tests and construction of this equipment for our lidar system IV will be reported.

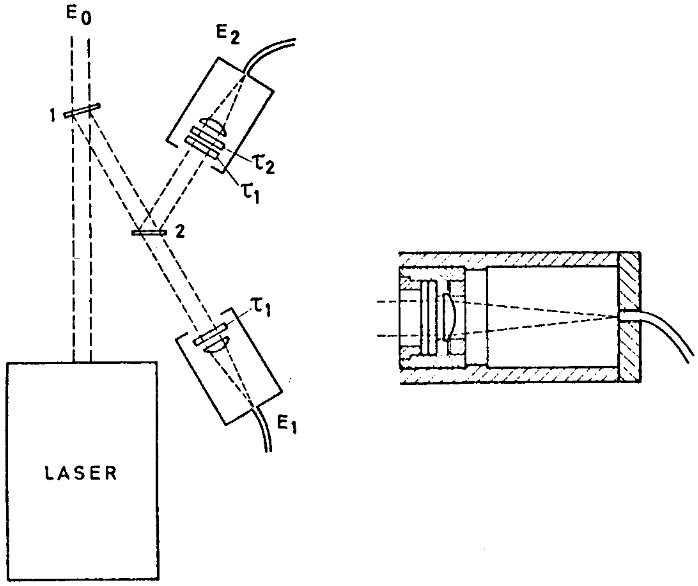

Fig.: Principle of the wavelength measurement