Although beamsplitting with a polarizing beamsplitting cube and half wave plates may seem more complicated and intimidating at first, the almost lossless nature of the optics compared with variable "reflective" coating which absorb beaucoup de photons make them invaluble for the low power He-Ne holographer. The low cost of cubes taken out of video disc machines on the surplus market makes them affordable, ($15-25) and good enough rotating stages from the hardware store for the half wave plates complete the set up with a minimum of cash outlay.
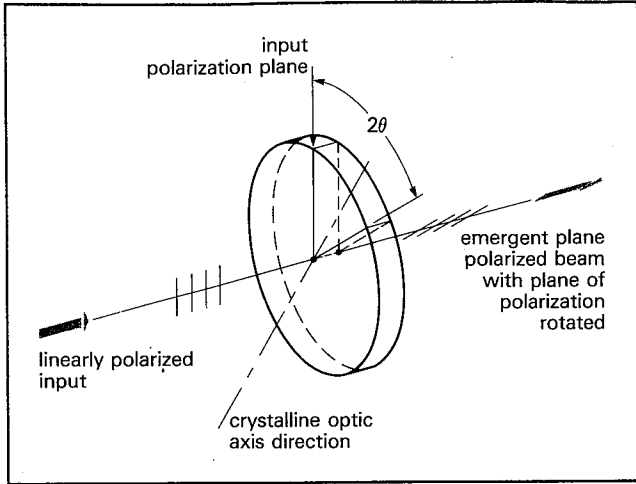
HALF-WAVE PLATE EFFECT ON LINEARLY POLAR-IZED LASER BEAM. The plane of polarization of the beam can be rotated at will without rotating the laser. The plane of polarization is essentially reflected in a plane containing the crystalline optic axis, and the output plane rotates at twice the angle rate of the retarder.
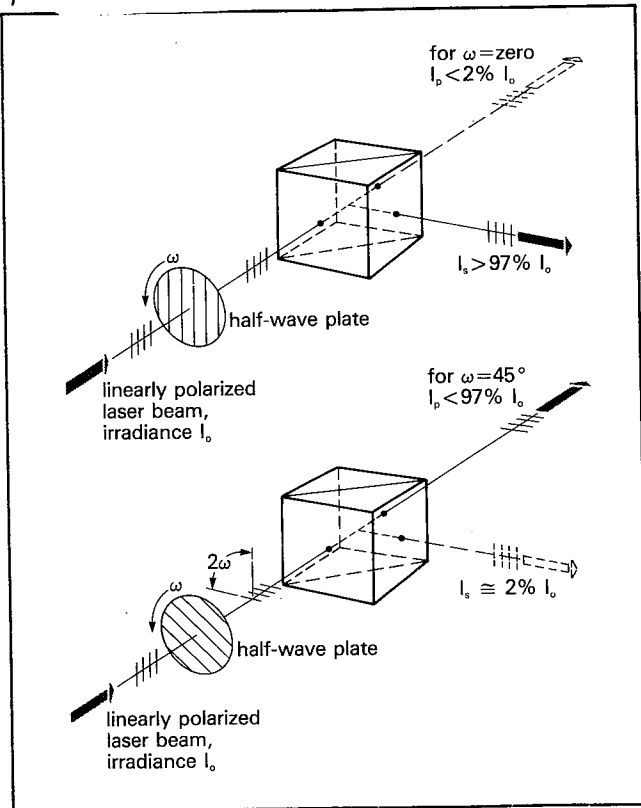
VARIABLE RATIO BEAMSPLITTER: The half-wave plate rotates with angular velocity ω while the permitted plane of output polarization (here suggested by lines on the highly transparent retarder) rotates at angular velocity 2ω. The polarized beams which finally emerge from the cube have the irradiances I_s I_p indicated. Intermediate irradiances are seen at intermediate times.

TRANSLATION

A polarized laser beam can come out of the half wave plate at any plane of polarization that you please.

By rotating the polarization plane the holographer can produce any ratio of relative intensities of the two beams.

As you would suspect, an incoming laser beam polarized in a plane 45 degrees from the normal will be split 50/50.

!!CAUTION!!

Notice that the two beams are polarized perpendicular to each other! A second and even third half wave plate might be necessary to align their vectors so that they can interfere!

The horizontally polarized beam could be used as is for a horizontally incident reference beam, while the vertically polarized one needs to be adjusted.

See the sheet, "ALIGNING POLARIZATION VECTORS"

The two output beams' polarization vectors are fixed, andindependent of the incoming polarization.

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