PH522 BL1

Objective: To obtain laser oscillation with a HeNe gain tube and two mirrors.

Equipment: 1) HeNe gain tube

2) Commercial HeNe laser for alignment.

3) Two flat mirrors for use with the alignment laser.

4) One 1" diameter high quality flat mirror, highly reflective. Take extreme care not to touch the surfaces of this mirror.

5) One output coupler, R=60 cm, very small high-quality mirror.

6) Power meter

Procedure:

1) Uthe two flat mirrors to steer the commercial laser so that it goes down the center of the bore of the gain tube. Ask your TA to verify the quality of your reference beam alignment before proceeding to the next step.

2) Place the flat cavity mirror a small distance beyond the end of the gain tube. Carefully adjust the orientation of this flat mirror so that the reference beam is reflected on itself. When the retro-reflection is just right the reference laser may begin to fluctuate.

3) Now insert the 60-cm output coupler on the other side of the gain tube. Coarsely align the output coupler to retro-reflect the beam. This is only a crude alignment, but when lasing is achieved, the reflected beam will probably be only a few mm from the center of this face.

4) Turn on the gain tube. If you are extremely lucky, the laser formed by the gain tube and the two cavity mirrors will immediately lase. It is much more likely that you will need to adjust the output coupler in order to achieve lasing.

5) Carefully adjust the orientation of both cavity mirrors to maximize the output power. Note the maximum power you achieve.

6) Examine the beam size and shape at a distance. Sketch the shape observed when the laser is adjusted for maximum power. Vary the cavity mirrors, and note any changes in the shape of the output beam.

7) Disassemble the setup and repeat. If one of you did most of the alignment, switch roles. Lab participation is a major part of your grade for this lab.