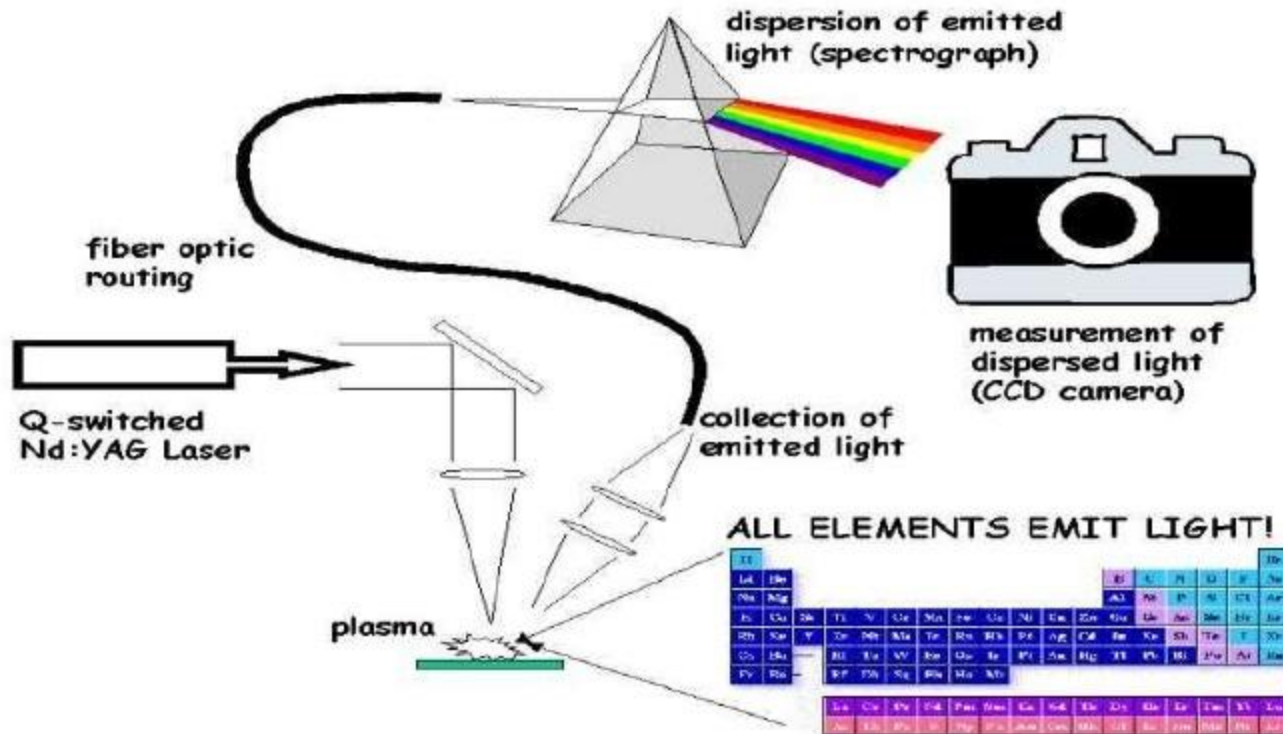


APPLICATION OF LASER

Unit-5

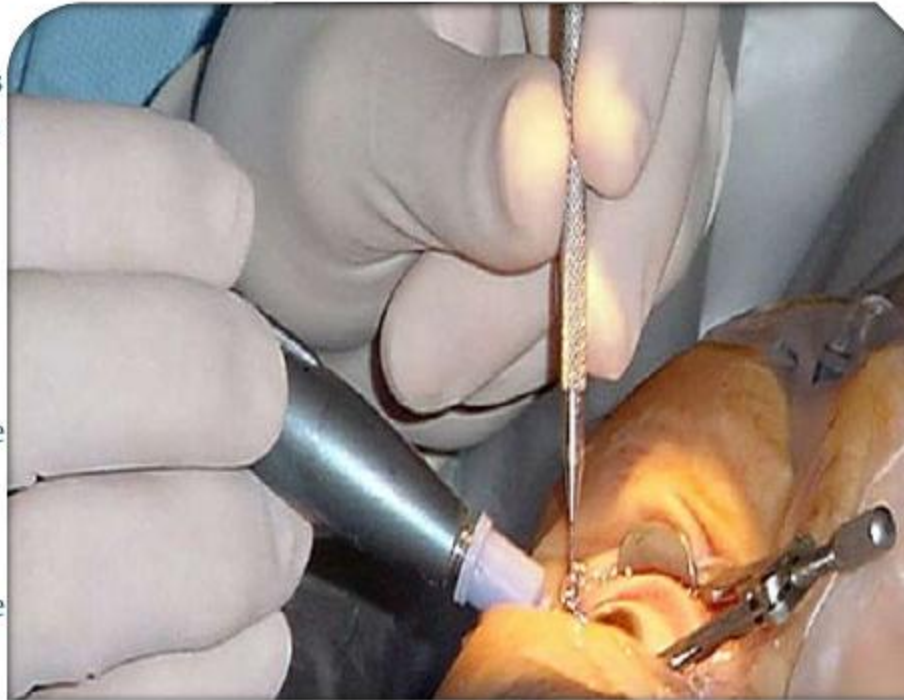
SPECTROGRAPHY



SPECTROSCOPY

Most types of laser are an inherently pure source of light; they emit near-monochromatic light with a very well defined range of wavelengths. By careful design of the laser components, the purity of the laser light (measured as the "linewidth") can be improved more than the purity of any other light source. This makes the laser a very useful source for spectroscopy. The high intensity of light that can be achieved in a small, well collimated beam can also be used to induce a nonlinear optical effect in a sample, which makes techniques such as Raman spectroscopy possible. Other spectroscopic techniques based on lasers can be used to make extremely sensitive detectors of various molecules, able to measure molecular concentrations in the parts-per-trillion (ppt) level. Due to the high power densities achievable by lasers, beam-induced atomic emission is possible: this technique is termed Laser induced breakdown spectroscopy (LIBS).

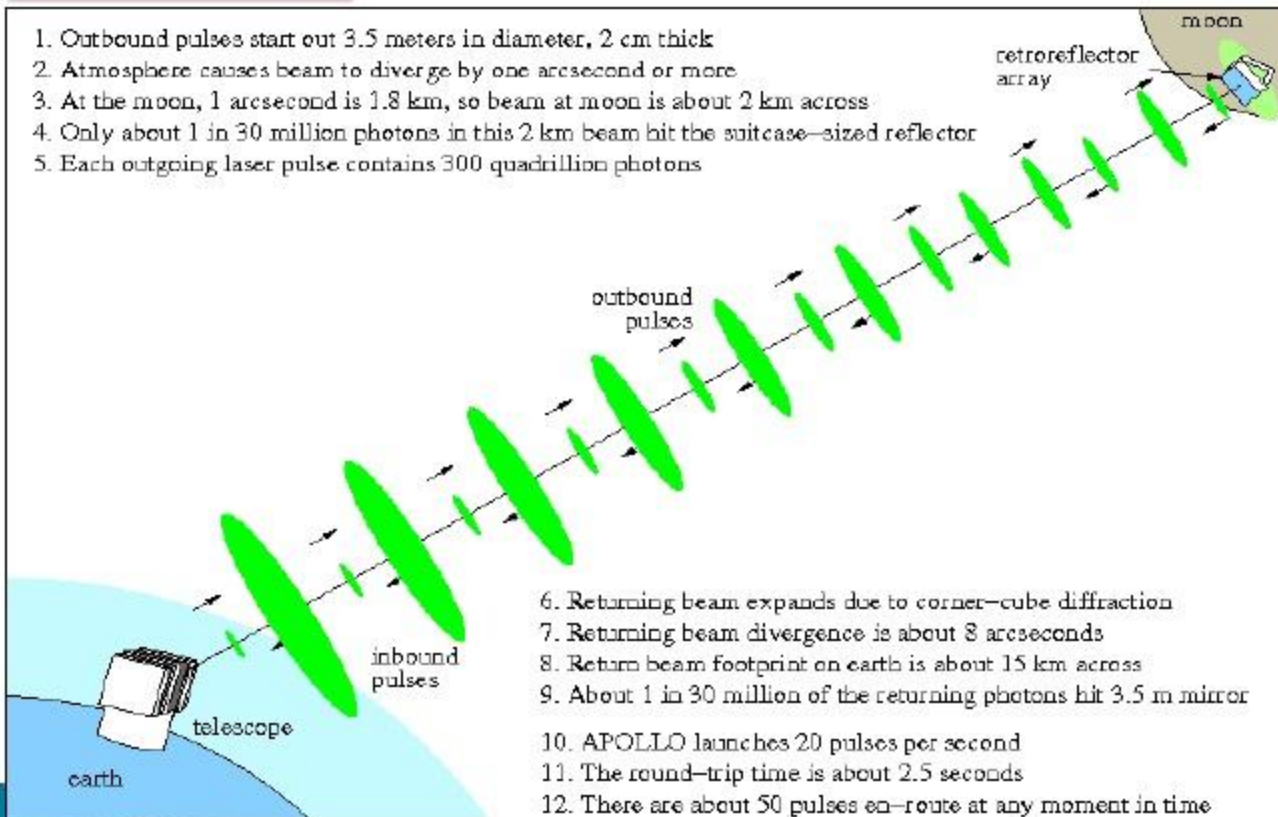
A cataract is an opacification or cloudiness of the eye's crystalline lens due to aging, disease, or trauma that typically prevents light from forming a clear image on the retina. If visual loss is significant, surgical removal of the lens may be warranted, with lost optical power usually replaced with a plastic intraocular lens (IOL). Due to the high prevalence of cataracts, cataract extraction is the most common eye surgery. Rest after surgery is recommended



CATARACT SURGERY

USES OF LASER IN LUNAR RANGING

1. Outbound pulses start out 3.5 meters in diameter, 2 cm thick
2. Atmosphere causes beam to diverge by one arcsecond or more
3. At the moon, 1 arcsecond is 1.8 km, so beam at moon is about 2 km across
4. Only about 1 in 30 million photons in this 2 km beam hit the suitcase-sized reflector
5. Each outgoing laser pulse contains 300 quadrillion photons



6. Returning beam expands due to corner-cube diffraction
7. Returning beam divergence is about 8 arcseconds
8. Return beam footprint on earth is about 15 km across
9. About 1 in 30 million of the returning photons hit 3.5 m mirror
10. APOLLO launches 20 pulses per second
11. The round-trip time is about 2.5 seconds
12. There are about 50 pulses en-route at any moment in time