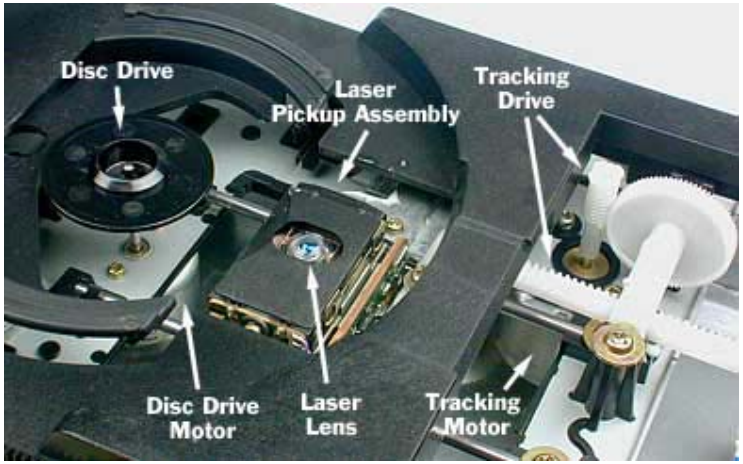
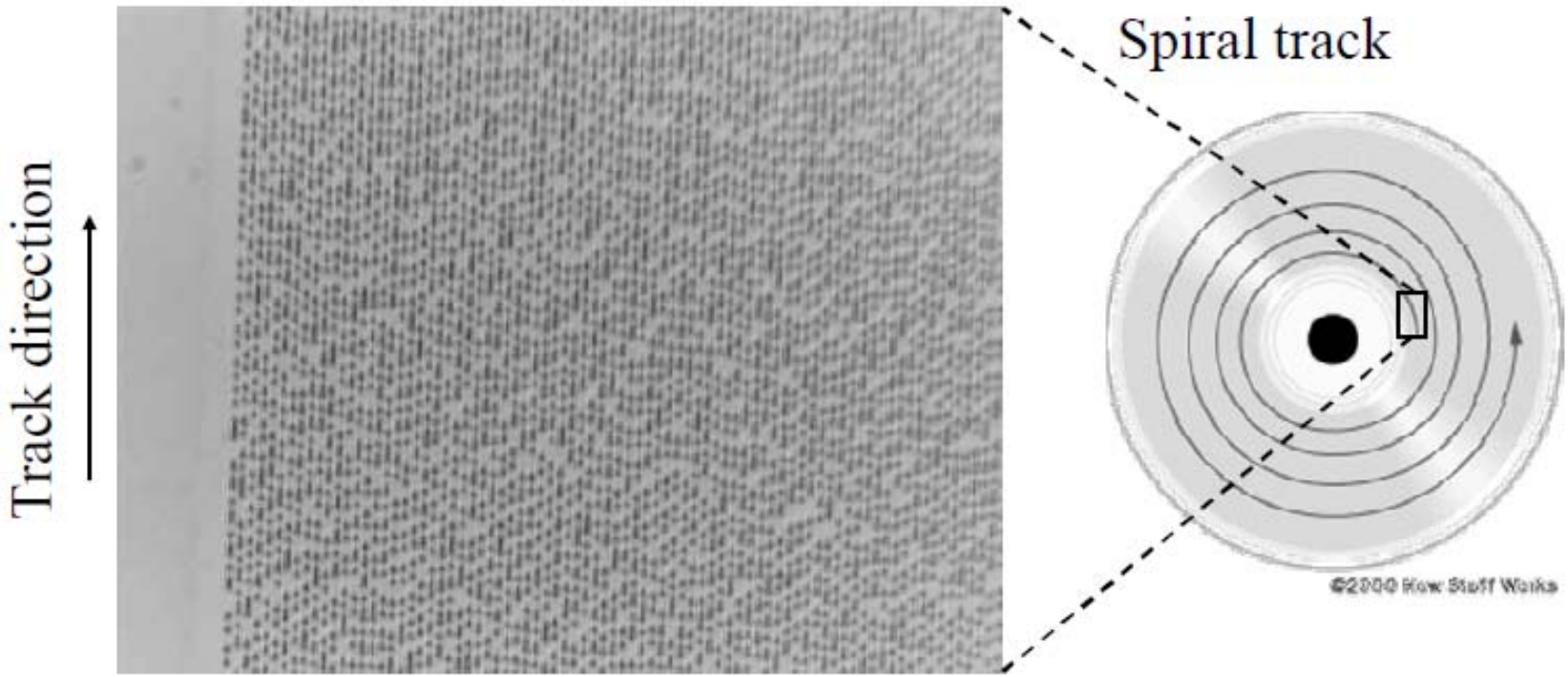
The CD Player

- uses refraction
- uses diffraction
- uses interference
- uses polarization

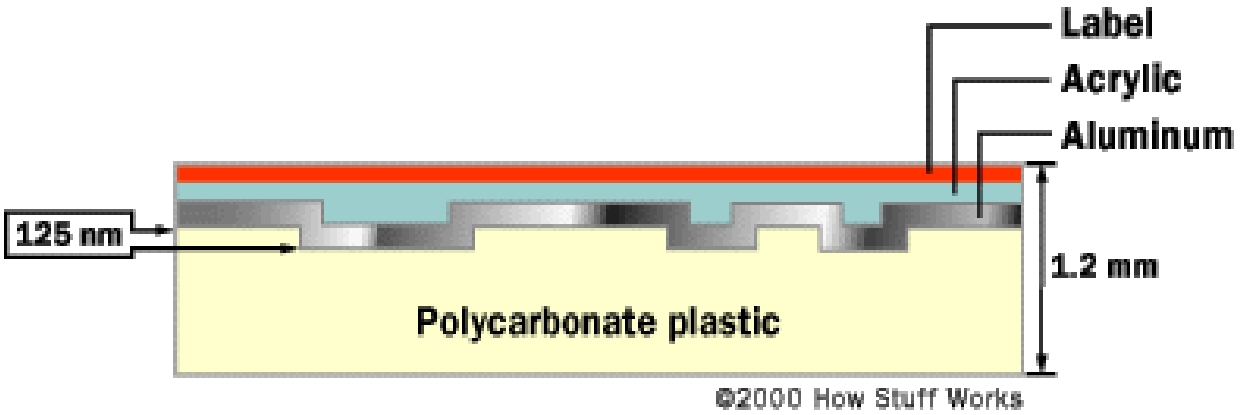


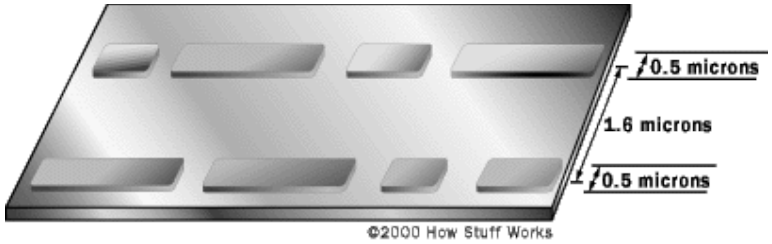
CD Under a Microscope



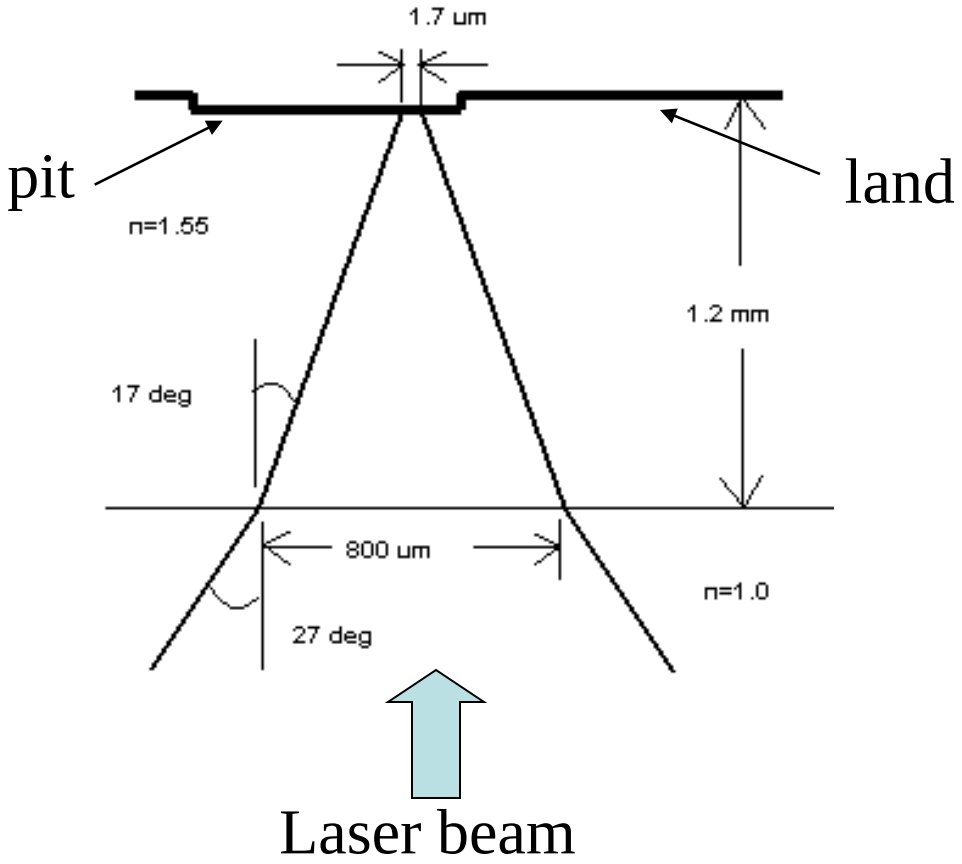
Low-magnification (×32) image of a CD showing an edge of the data zone.

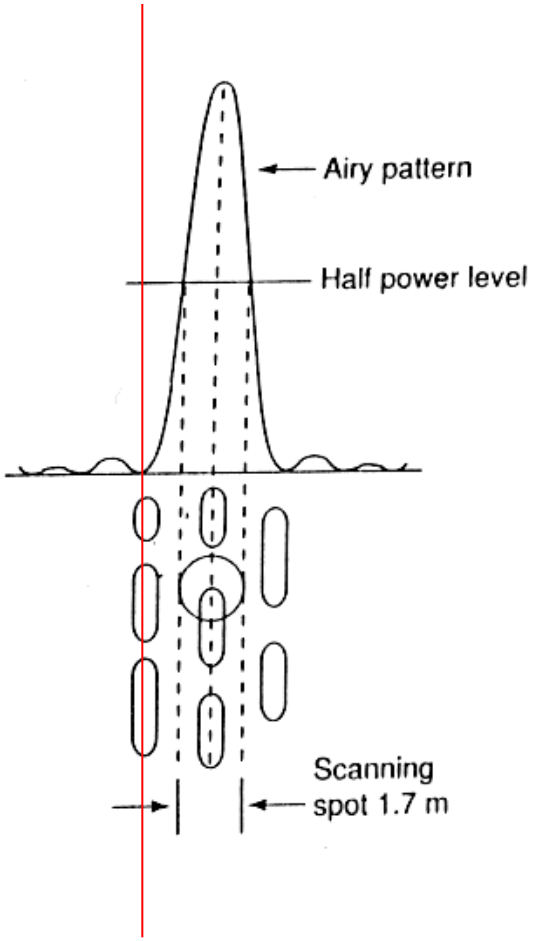
Digital Encoding into Bumps



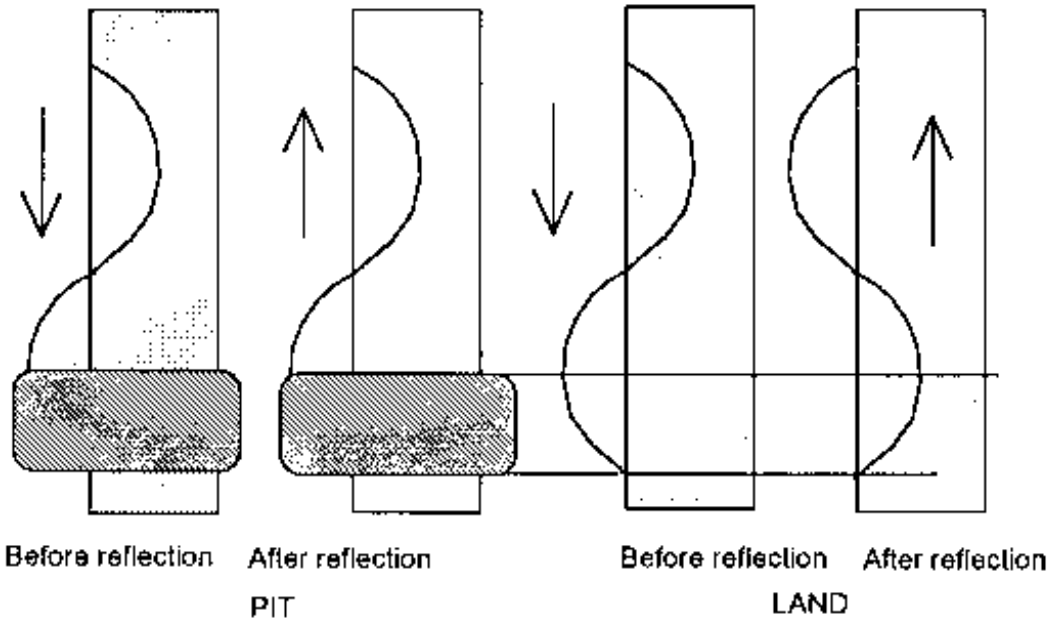


Refraction and Diffraction



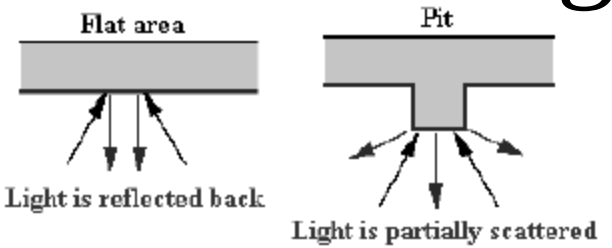


Readout: Interference



λ= 780 nm
n = 1.55
Pit height = 125 nm
(λ/n)/4 = 125 nm

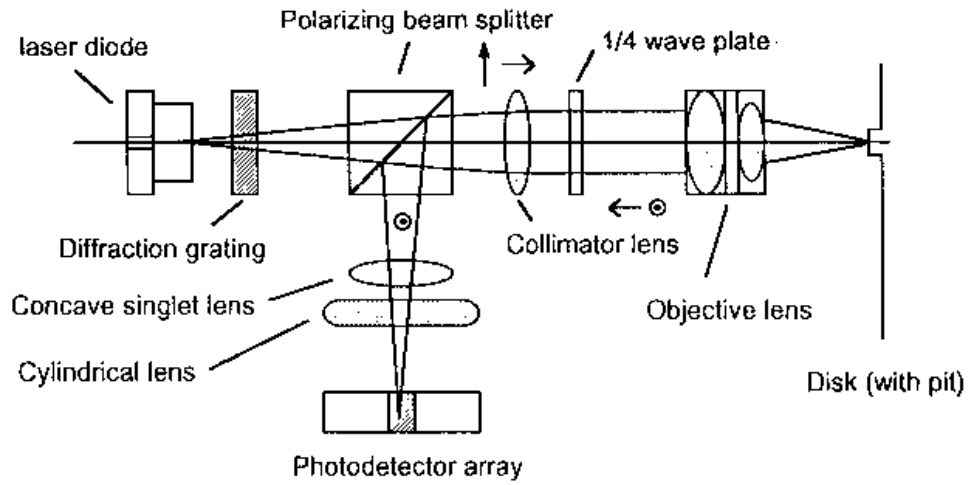
Or Scattering?

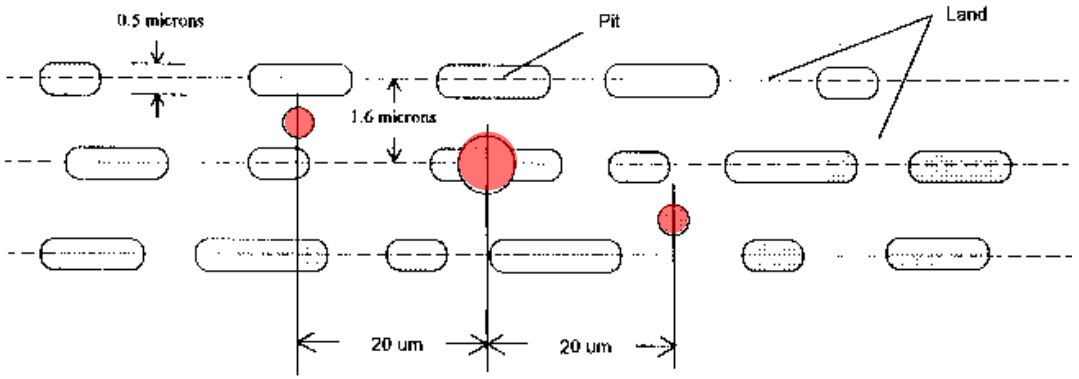


Pits are 120 nm deep and 600 nm wide. Laser beam scatters when it scans a pit, which translates into a drop in reflected beam intensity.

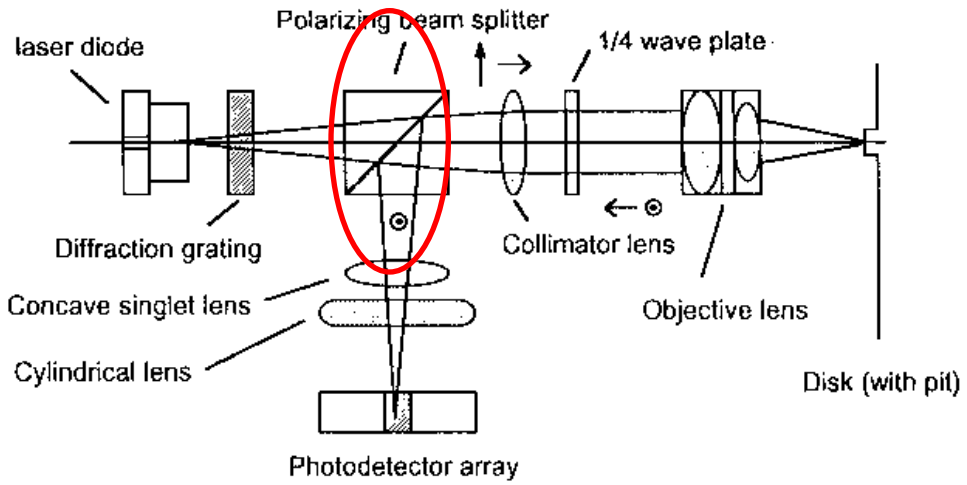
The pit acts as a sub-wavelength scatterer

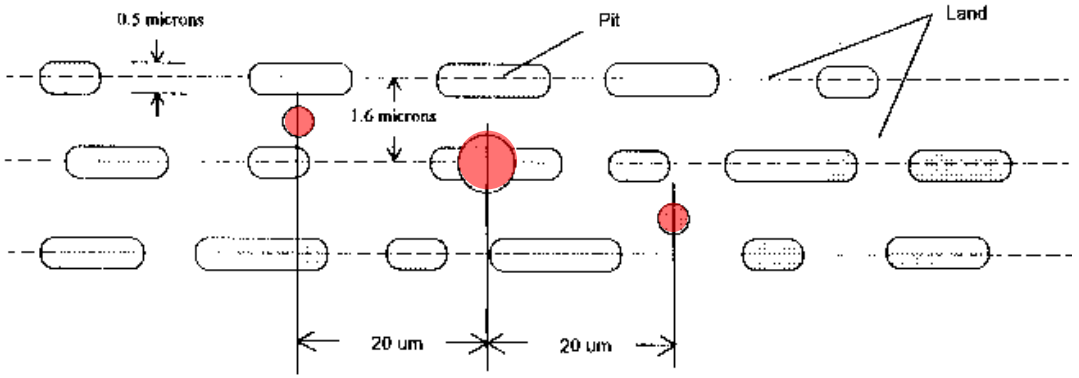
Tracking - uses diffraction



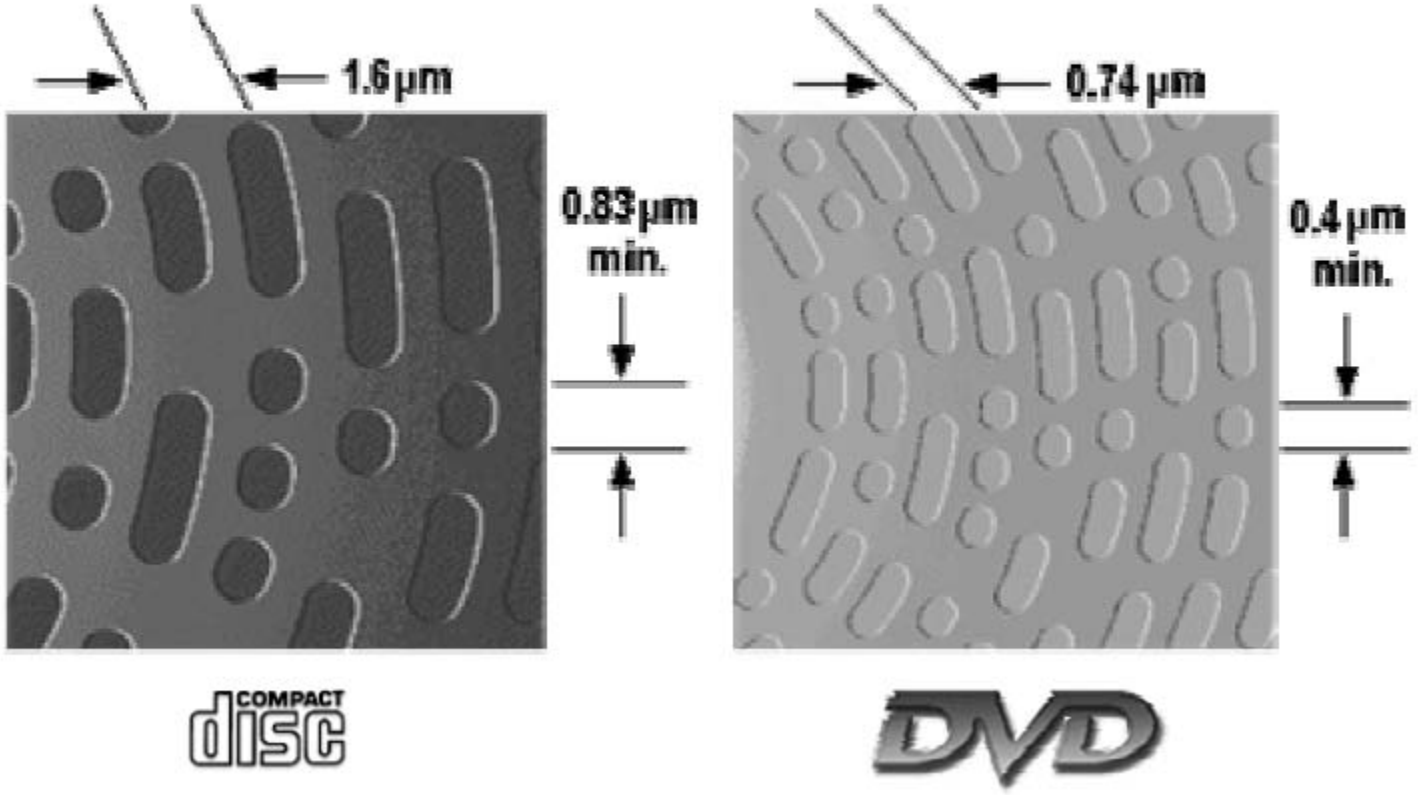


Tracking - uses polarization

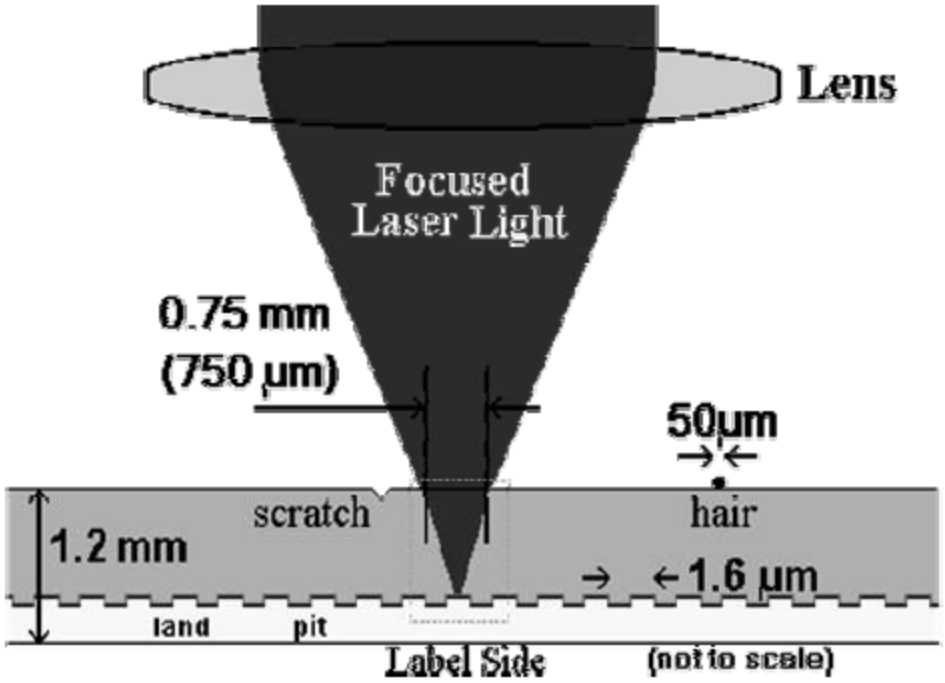




CD Versus DVD



Why Focus the Laser Light through the Substrate?



Optics of Readout