Scattering Phenomena

Rayleigh Scattering

Particles << λ (air molecules)

Intensity $\propto 1/\lambda^4$

Why sky is blue

Used in DLS for size measurement

Mie Scattering

Particles ≈ λ (cells, bacteria)

Complex angular distribution

Flow cytometry application

Forward/side scatter

Dynamic Light Scattering

Measures Brownian motion

Hydrodynamic radius determination

Protein aggregation studies

Nanoparticle characterization

Raman Scattering

Inelastic scattering

Molecular fingerprinting

Label-free chemical analysis

Surface enhancement (SERS)

Biological Applications

Cell sorting: Forward/side scatter in flow cytometry

Protein analysis: DLS for aggregation and stability

Tissue imaging: Raman microscopy for cancer detection