

Optical spectroscopy: a major window on the world

Some foreshadowing:

Quantum mechanics → discrete energy levels,
e.g., of electrons in atoms or molecules.

When an atom transitions between energy levels it emits light of a very particular frequency.

Every substance has its own signature of what colors it can emit.

By measuring the colors, we can determine the substance, as well as things about its surroundings (*e.g.*, temperature, magnetic fields), whether its moving (via the Doppler effect), *etc.*

Optical spectroscopy is invaluable in materials research, engineering, chemistry, biology, medicine...

But how do we precisely measure wavelengths?