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Angular momentum of light and atoms

Atoms provide a convenient medium to store and transform information encoded in light beams. Atom optics conventionally describes the effect of polarisation and light intensity on atoms. Here I will discuss how the complex structure of light beams, and in particular their orbital angular momentum (OAM) can affect the internal and external atomic states. I will describe the transfer of structured light beams across the visible spectrum from IR pump light to blue output light by using the internal atomic levels in a multi-photon cascade process, show how dense atomic samples can be generated aided by structured light beams and finally demonstrate how 3D information of optical light beams can be obtained by observing the light scattered off an atomic vapour.