Diffraction of light at relativistic intensities

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Diffraction of a relativistically strong laser beam generates high-order harmonics of the incident pulse. In this process, the optical properties of the harmonic beams are determined by the 2D electron dynamics on the periphery of the diffraction window. Thus, the pattern of electron motion can be imprinted to the harmonics. In particular, we found the spin angular momentum carried by the drive laser can be converted into the orbital angular momenta of the harmonic beams, leading to interesting phenomena of spin-obital interaction of light. In this talk, I will describe a theoretical model ("relativistic oscillating window") for the diffraction of relativistic laser beams, which captures the rules for angular momentum conversion in the high-order harmonic generation process *via* diffraction.