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Dichroism in Chiral Free Electrons Scattering from Plasmonic Nanostructures[1] CAMERON JOHNSON, BENJAMIN MCMORRAN, University of Oregon — The spatial amplitude and phase of a free electron can be efficiently shaped with the use of off-axis material holograms similar to the way spatial light modulators are used in light optics. These holograms can be used to apply an azimuthally varying phase to the electron wavefront imparting quantized amounts of orbital angular momentum. We show simulations and experiments to measure the energy dependent transfer of orbital angular momentum from a chiral free electron to plasmonic modes of metallic nanoparticle clusters and how these spectra can exhibit dichroism with respect to the cluster's orientation and chirality of the incident electron. Furthermore, we provide an outlook for the future use of singular electron beams probing local inelastic excitations in an orbital angular momentum basis.

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