Angular Momentum Transfer in Coherent Thomson Scattering of Laguerre-Gauss Beams

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We calculate, within the framework of the local plane wave approximation [1], the total angular momentum of the field emitted in the coherent scattering of the electromagnetic field described as a Laguerre-Gauss beam on a thin electron sheet in relativistic motion. The results constitute a completion of our previously published work; we present the calculation of the electromagnetic potential of the emitted field up to the third order in the inverse distance to the observation point, and then the electric and magnetic fields, total linear and angular momentum. We study the relation between the total angular momentum and the helical structure of the phase of the electric field discussed in [1]. Also, an analysis of the role of the interference between fields emitted from different points of the sheet is included.

References

[1] P-V Toma, A C Opinca, V Baran and M Boca, Phys. Rev. A **111**, 013101 (2025)