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Two-gluon one-photon vertex in a magnetic field and its explicit one-loop approximation in the intermediate field strength regime

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Abstract

We find the general structure for the two-gluon one-photon vertex in the presence of a constant magnetic field. We show that, when accounting for the symmetries satisfied by the strong and electromagnetic interactions under parity, charge conjugation and gluon interchange, and for gluons and photons on mass-shell, there exist only three possible tensor structures that span the vertex. These correspond to external products of the polarization vectors for each of the particles in the vertex. We also explicitly compute the one-loop approximation to this vertex in the intermediate field strength regime, which is the most appropriate one to describe possible effects of the presence of a magnetic field to enhance photon emission during pre-equilibrium in peripheral relativistic heavy-ion collisions. We show that the most favored direction for the photon to propagate is in the plane transverse to the field, which is consistent with a positive contribution to ν_2 and may help to understand the larger than expected elliptic flow coefficient measured in this kind of reactions.

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