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Production of a Higgs boson in association with a pair of fermions in the presence of a circularly polarized laser field

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In the centre of mass frame, we have investigated the process of Higgs-strahlung production in association with a pair of fermions, $e^+e^- \rightarrow f\bar{f}H$, at the leading order in the presence of an intense electromagnetic field with circular polarization. Our analytical calculations are based on the Narrow Width Approximation (NWA), which is valid in the leading order as $\Gamma_Z/M_Z = 2\%$. We have considered only the initial particles inside the laser field as a first step. In the second part, we have embedded both initial and final particles in the laser field. We have analyzed the angular distribution of the produced Higgs boson as a function of the laser parameters in both cases. We have found that, the order of magnitude of the differential cross-section of both processes $e^+e^- \rightarrow \mu^+\mu^-H$ and $e^+e^- \rightarrow b\bar{b}H$ is reduced more significantly in the case where both initial and final particles are embedded in the laser field.

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