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Z polarization as a probe of anomalous gauge-Higgs coupling

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Z boson being a spin-one particle provides eight polarization parameters. We show how the Z boson polarization can be used to study the ZH production at future e^+e^- colliders and at the LHC. Using the spin density matrix of the Z -boson we calculate the 8 independent polarization parameters which are sensitive to anomalous gauge-Higgs couplings. We then estimate bounds on the anomalous ZZH couplings by constructing angular asymmetries from the Z boson decay leptons, which are related to the polarization observables. Taking into account possible longitudinal beam polarizations at two different center of mass energies, we find that oppositely polarized beams at 500 GeV c.m. energy provides tighter bounds on the couplings than the same sign polarized and unpolarized beams. We find that most of the 1σ limits are of the order of a few times 10^{-3} for 14 TeV LHC with integrated luminosity of 1000 fb^{-1} and for 500 GeV e^+e^- colliders with oppositely polarized beams.

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