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The Higgs self-coupling and its implications

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While the Higgs couplings to heavy Standard Model particles have now been measured reasonably well, the Higgs self-interactions remain notoriously intangible at the LHC. There exist some particular new physics dynamics that parametrically enhance these self-interactions over the SM expectations. Given that these self-interactions control the fate of the electroweak vacuum and are also at the heart of the hierarchy problem, assessing them is an urgent question. I'll show how to probe, via its quantum effects, the cubic self-coupling in a global fit of the Higgs data. I'll discuss some prospects at HL-LHC as well as at future lepton colliders. Some implications for Higgs portal model and the production of a stochastic gravitational wave background will be discussed.

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