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Physics Opportunities at the Muon Collider

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The muon collider, a proposed facility that combines high collision energies with a clean experimental environment, offers compelling opportunities for advancing particle physics. This talk will explore its dual strengths: enabling precision measurements within the Standard Model and extending the search for new physics. We will specifically highlight its exceptional potential for probing the quartic Higgs–gauge boson coupling, taking advantage of the dominance of vector boson fusion processes at high energies, which effectively transform the collider into a 'gauge boson collider'. Furthermore, we will discuss the unique capability of the muon collider to investigate Heavy Neutral Leptons (HNLs), emphasizing how its well-defined initial state can be exploited to distinguish between Dirac and Majorana scenarios.

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