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Probing effective muon interactions using the NA64μ experiment at CERN

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In this work we analyze how NA64μ can contribute to the global SMEFT program by probing two effective four lepton operators completely unbounded so far and break one of the current flat directions. Furthermore, we also study the potential of NA64 testing an extension of SMEFT that includes fermion singlets of the SM gauge group in the low energy field content. This effective field theory, usually dubbed νSMEFT, is well motivated by the observation of light neutrino masses and leptonic mixing. We find that NA64μ can constrain three unbounded four fermion operators of the νSMEFT. We derive the current leading bounds on these operators and compute the future sensitivity. Our results fill the gap between the current experimental program and a possible future muon collider able to probe this type of New Physics.

Abstract

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