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Search for the dimuon decay of the Higgs boson with the ATLAS detector

ATLAS and CMS experiments have confirmed Higgs boson’ s role in giving mass to the weak bosons and 3rd generation charged fermions. However, whether the other generations of fermions acquire mass through the same mechanism remains an open question. The Higgs boson’ s decay to a pair of muons provides a direct probe of its Yukawa coupling to second-generation fermions. In this talk, I will presents the newest results from the ATLAS experiment based on proton-proton collision data collected in LHC Run 3 during 2022˜2024, and the combination with the Run 2 results, incorporating several improvements. This measurement significantly enhance the sensitivity over previous ATLAS publications, provides the first evidence for the H \to \mu\mu decay by the ATLAS experiment and marks a significant step toward understanding the origin of mass for the 2nd generation fermions.

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