

Probing Compressed Inert Scalars with Forward Muon Tagging at the Muon Collider

Tuesday, 17 February 2026 15:30 (20 minutes)

The compressed mass spectrum of the electroweak inert scalar models pose a significant challenge for current collider experiments, as the soft visible decay products and suppressed production rates hinder conventional search strategies. In this talk, I will explore the discovery prospects of such a compressed electroweak sector at a future high energy Muon Collider operating at 10 TeV. Focusing on vector boson fusion (VBF) production of inert scalar pairs, I will demonstrate how forward muon tagging provides a powerful handle to isolate signal events in scenarios where traditional missing energy based searches fail. After reviewing the relevant dark matter and experimental constraints on the model parameter space, I will present a detailed collider analysis using both cut-based methods and multivariate techniques. The impact of detector energy resolution will be discussed, highlighting the importance of precision instrumentation. Our results show that even in highly compressed and experimentally challenging scenarios, the clean environment and forward coverage of the Muon Collider can significantly enhance discovery potential, making it a compelling probe of dark sectors.

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Session Classification: parallel session B: Higgs