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A jet-free route to observing HH->4b

Sunday, 21 December 2025 15:20 (20 minutes)

I will present a new jet-free strategy for the $HH \to 4b$ search at the LHC that enhances sensitivity by more than a factor of five compared with current approaches. The method uses all-particle inputs to jointly identify $h_1h_2 \to 4b$ across variable Higgs-candidate masses and to estimate (m_{h_1}, m_{h_2}) via a mass-decorrelated multiclass classifier. A key feature is that the HH response can be calibrated directly using the $ZZ \to 4b$ proxy. After validating the framework with a high-fidelity simulation workflow, we find that two experimental conditions are crucial for reaching the demonstrated performance. With Run 2+3 data, this approach puts an observation of di-Higgs production within reach and opens the door to constraints on κ_λ competitive with HL-LHC expectations. I will discuss both the methodology and its implications for redefining the LHC's search potential in di-Higgs studies.
This talk is based on arXiv:2508.15048v2.

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