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Evaluating strange-tagging performance for SiD fast- and full-simulation

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In this work we will present first results on the comparison of strange-quark jet tagging for full-detector and Delphes fast simulation using the SiD detector concept. Strange tagging plays a crucial role in the complete exploration of the second-generation Yukawa couplings and in probing new physics frontiers with the strange quark, inaccessible at the LHC. At future electron-positron (e^+e^-) Higgs factories, strange-tagging (s-tagging) is tightly connected with detector technologies and layout optimization. Existing studies have demonstrated the potential for s-tagging at future Higgs factories but have relied either on full simulation or a fast simulation approach assuming different detector concepts and without evaluating their relative performance. In this study, we compare, for the first time, the performance of the ParticleNet algorithm for s-tagging using both full- and fast-simulation Higgs samples for a common detector, SiD. The analysis will provide insights into the strengths and limitations of fast simulation in reproducing the detailed detector effects captured by full simulation. Our findings will inform the optimization of detector design and analysis strategies for future e^+e^- colliders.

Primary authors: VERNIERI, Caterina (SLAC); NTOUNIS, Dimitris (SLAC); STRUBE, Jan (PNNL); GOUSKOS, Loukas (Brown University)

Presenter: NTOUNIS, Dimitris (SLAC)

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