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From boosted H→WW* taggers to inclusively pre-trained jet models at the LHC

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The SM and BSM searches via Lorentz-boosted jets are a key focus at the LHC, yet much of the potential phase space remains underexplored. In this talk, we first present the recent transformer-based tagger developed within CMS for SM H→WW* decays and demonstrate its superior performance. Building upon this, we introduce the next-generation Global Particle Transformer 3 (GloParT-3), designed to cover a broad phase space with 750 output nodes. We highlight its training philosophy, dubbed the Signature-Oriented Pre-training for Heavy-resonance ObservatioN (Sophon), and discuss the fine-tuning potential from its hidden layer scores. This new tagger not only improves tagging performance for boosted Higgs/Z/W/Top jets but also has advantages in detecting BSM resonances through direct tagging and fine-tuning, promising significant progress in jet tagging for future CMS analyses.

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