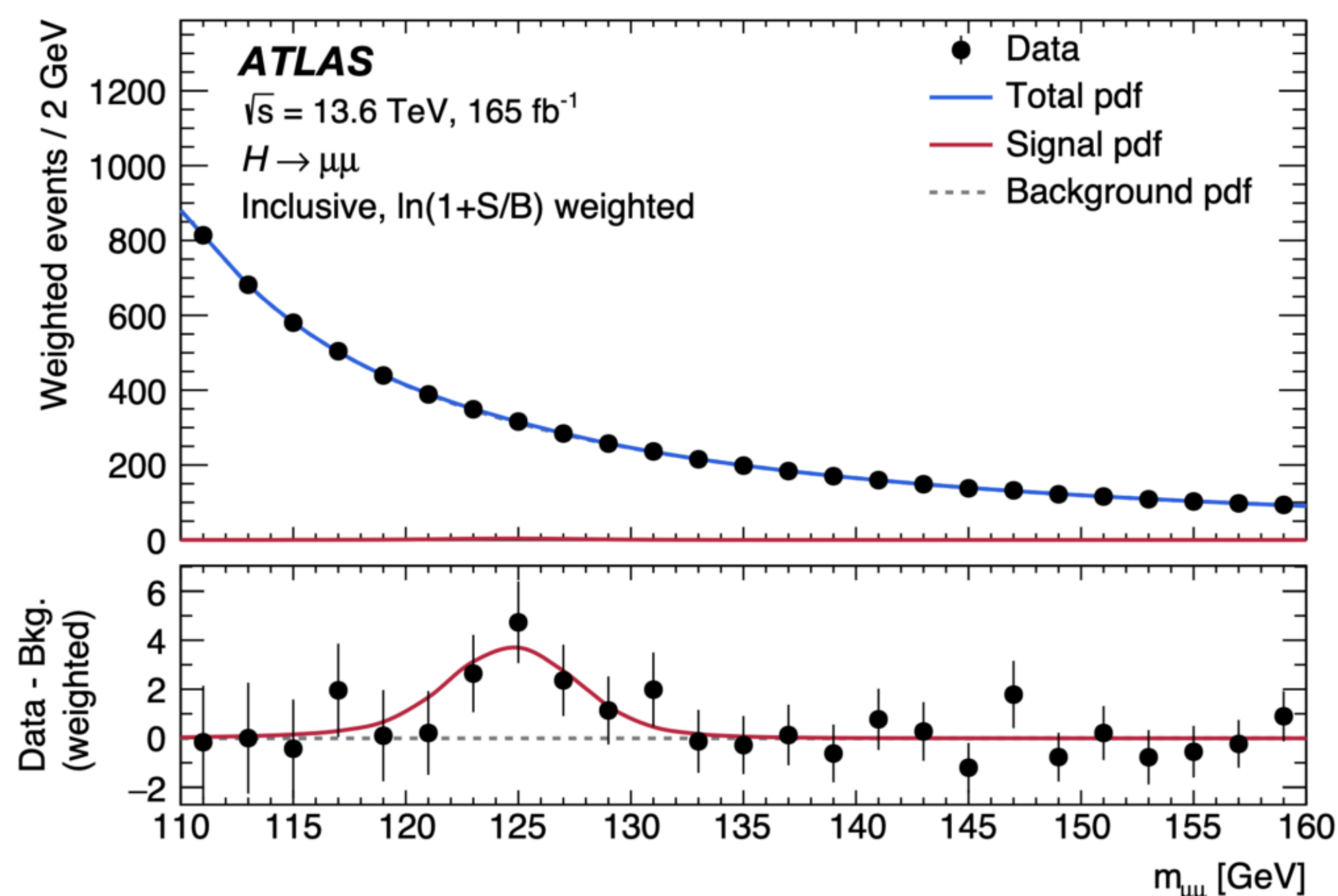


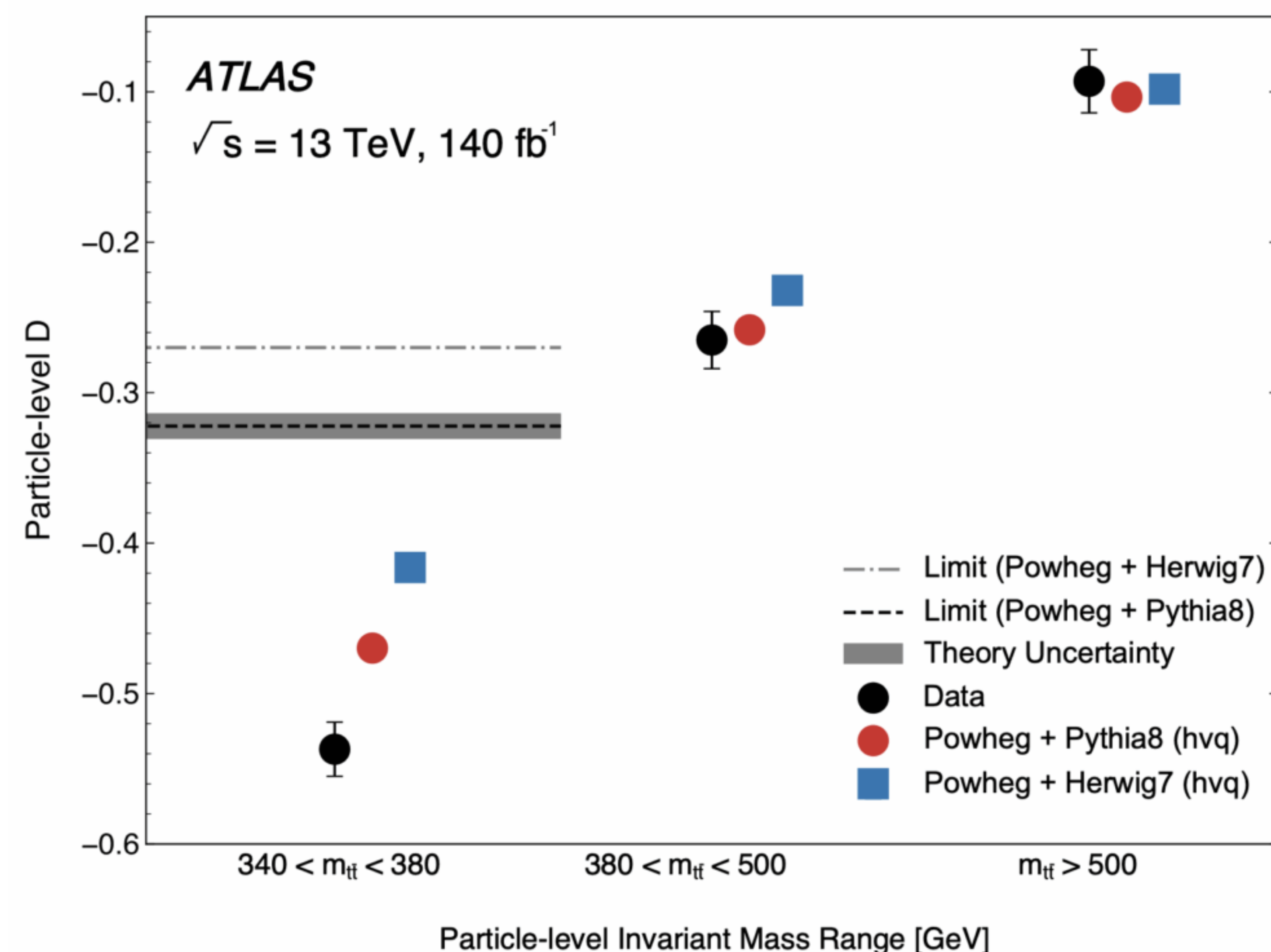
The Higgs Boson



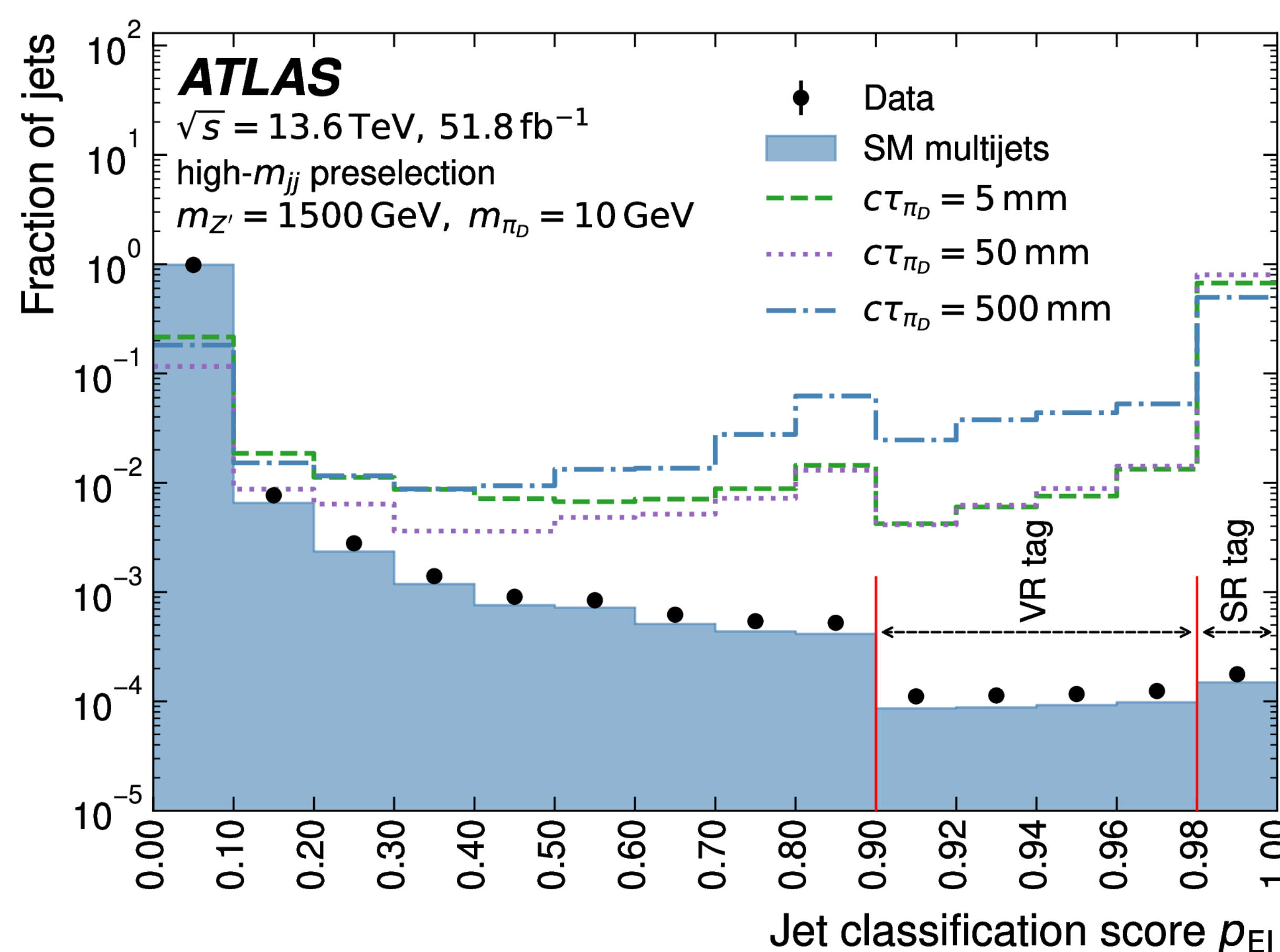
- **rare** Higgs boson **decays** ($H \rightarrow \mu\mu$) that probe its coupling to second-generation leptons
- **di-Higgs** **searches** ($HH \rightarrow b\bar{b}\tau\tau$) that probe the Higgs boson self-coupling
- **associated production** with top quarks ($t\bar{t}+H$ and $t+H$) that measure the Higgs boson coupling to the heaviest quark
- muon and τ -lepton **identification** and **reconstruction** performance

Top-quark physics

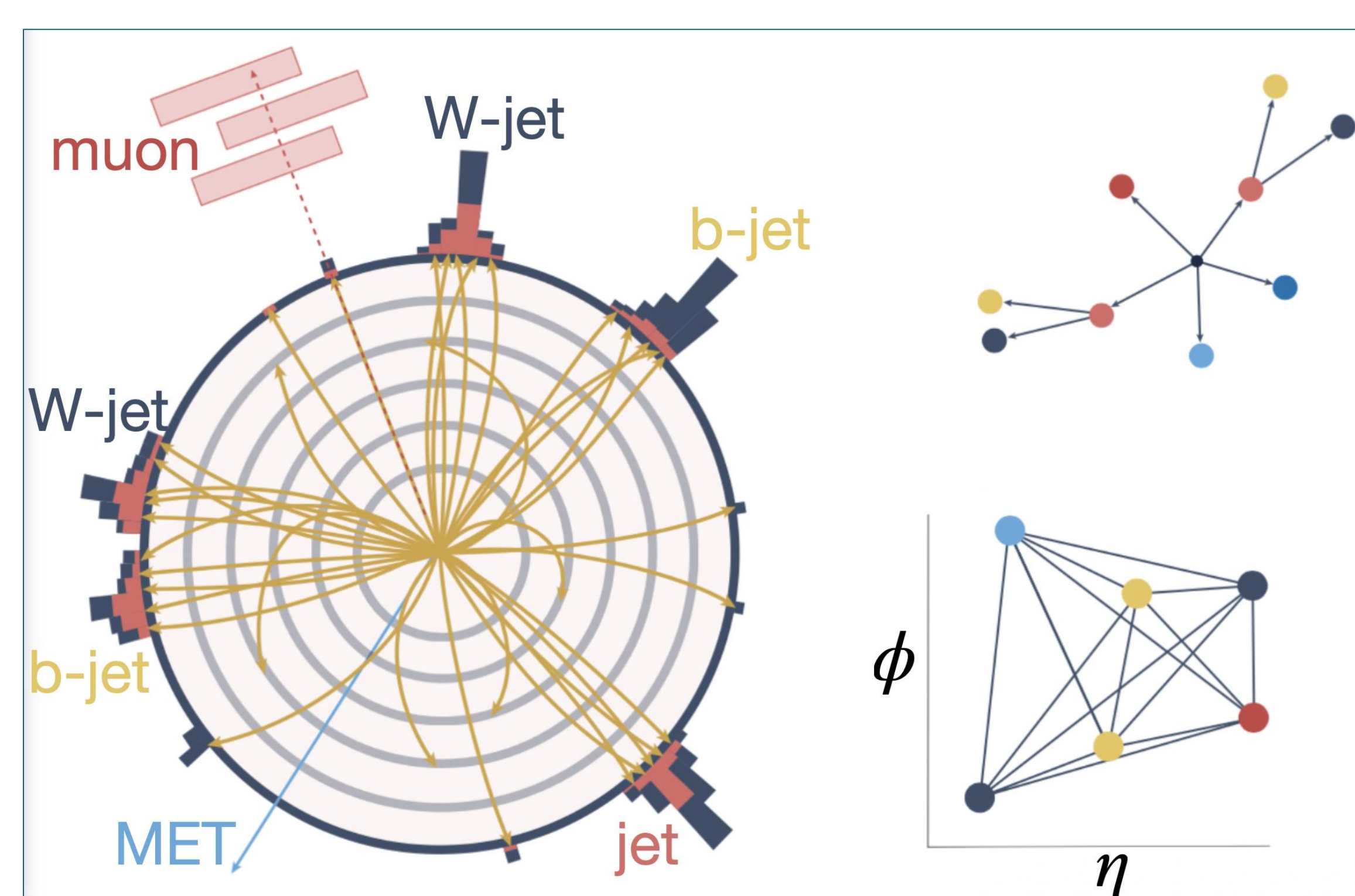
- study of **quantum entanglement** in top/anti-top events, via spin correlations
- exploring **quantum information observables** (e.g., discord and steering) as new windows on physics beyond the Standard Model
- study of **toponium**, the quasi-bound top/anti-top state



Beyond the Standard Model



- dark matter searches in hadronic final states (**jet+ E_T^{miss}** , **semi-visible** and **emerging jets**)
- **high-mass resonance** searches decaying in $ZZ \rightarrow 4\ell$
- searches for the pair-production of **leptoquarks**



Machine Learning

- model-agnostic **anomaly detection**
- Interpretable HEP foundation models
- advanced particle **reconstruction**