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Hunting coloured scalars with machine learning

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Several extensions of the Standard Model predict scalar states that are charged under QCD colour. Motivated by composite Higgs models, we study an electrically neutral colour octet and a colour sextet with charge $4/3$. Both states couple to top quarks such that pair production leads to a four top quark signature. We train neural networks to separate these signal processes from their SM backgrounds and derive the discovery reach and expected exclusion limits at the HL-LHC. We also show that our networks can be used to efficiently identify which state is present.

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