

## Jet Origin Identification and Quantum-based Jet clustering

Jet Origin Identification (JOI), which classifies jets into five quarks, five anti-quarks, and gluons, was introduced and successfully implemented using ParticleNet, achieving unprecedented performance in measuring the rare and exotic decays of the Higgs boson at the proposed Circular Electron-Positron Collider (CEPC). Additionally, we developed a quantum-based jet clustering algorithm utilizing the Quantum Approximate Optimization Algorithm (QAOA), demonstrating performance comparable to classical jet clustering algorithms in small-scale problems.

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