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Vision Calorimeter: deep-learning-based anti-neutron reconstruction in an electromagnetic calorimeter

Long-lived neutral hadrons, including (anti-)neutron and KL meson, are important probes for physics in the tau-charm energy region. However, most tau-charm facilities do not include dedicated hadronic calorimeters, and their neutral hadron detection must rely on the electromagnetic calorimeter (EMC). Because the EMC's small volume and dense material only partially contain hadronic showers, traditional reconstruction methods face significant limitations. In the talk, we introduce Vision Calorimeter (ViC), a deep-learning framework inspired by modern visual-object-detector architectures from computer vision. By leveraging an end-to-end, data-driven approach, ViC performs unified reconstruction of anti-neutrons, simultaneously identifying particle type, estimating the incident position on the EMC, and inferring the momentum magnitude.

Primary author: LI, Yangu (Peking University)

Presenter: LI, Yangu (Peking University)

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