

An extension of Associative Memory approach to tracking with a drift-tube detector using timing information and its demonstration for HL-LHC ATLAS muon trigger

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The Associative Memory (AM) approach has been developed and used in the HEP experiments in terms of on-line track-finding based on silicon detector hits. We intend an extension of the AM approach to tracking with a drift-tube detector, taking advantage of the drift time information to define the AM pattern in the parameter space of observables. As a benchmark, our study demonstrates the feasibility of the extended concept of the AM pattern with timing information, aiming at the online muon reconstruction with LHC-ATLAS Monitored Drift Tube (MDT) detector for Phase-2 Level-0 muon trigger system. The detailed design study shows the AM approach has a capability of a high-speed track finding with drift-tube detectors, satisfying the latency requirement for the ATLAS Phase-2 trigger system. The detailed design study, a methodology of the efficient pattern training, and an algorithm chain to realize online muon reconstruction and performance study will be presented.

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