

Particle identification with the iTOP detector at Belle-II

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The Belle-II experiment and superKEKB accelerator will form a next generation B-factory at KEK, capable of running at an instantaneous luminosity 40 times higher than the Belle detector and KEKB. This will allow for the elucidation of many facets of the Standard Model by performing precision measurements of its parameters, and provide sensitivity to many rare decays that are currently inaccessible.

This will require major upgrades to both the accelerator and detector subsystems. The imaging Time-of-propagation (iTOP) detector will be a new subdetector of Belle-II that will perform an integral role in Particle identification (PID). It will comprise 16 modules between the tracking detectors and calorimeter; each module consisting of a quartz radiator, approximately 2.5m in length, instrumented with an array of 32 micro-channel plate photodetectors (MCP-PMTs).

The passage of charged particles through the quartz will produce a cone of Cherenkov photons that will propagate along the length of the quartz, and be detected by the MCP-PMTs. The excellent spatial, and timing resolution (of better than 50 picoseconds) of the iTOP system will provide superior particle identification capabilities, particularly allowing for enhanced discrimination between pions and kaons that will be essential for many of the key measurements to be performed.

The status of the construction of the iTOP subdetector, and performance studies of prototypes at beam tests will be presented, together with prospects for physics measurements that will utilise the PID capabilities of the iTOP system.

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