

Study on high rate and ultrahigh time resolution TOF

Summary

Time of flight system (TOF) based on MRPC technology is widely used in modern physics experiments, and it also plays an important role. With the increase of accelerator energy and brightness of Collider, TOF system is required to indentify definite particles precisely under high rate environment. Undoubtedly this is a big challenge for TOF technology. For example, the momentum upper limit of K/PI separation is around 7GeV/c for JLab-SoLID TOF system under high particle rate as high as 20kHz/cm². So it is imperative to develop high rate and ultrahigh time resolution TOF system. In this project, we will investigate international advanced technology and develop high rate narrow gap MRPC and corresponding readout electronics system. The electronics system is focused on wave form digitizer system, fast amplifier and discriminator. FPGA based TDC will also be studied. Our goal is to develop a new TOF prototype with time resolution around 20ps and rate capability of 20kHz/cm². This system will meet the urgent needs of physics experiments and it can also push the technology of high precision particle detection.

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