Alignment of the BESIII MRPC Endcap TOF system

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- Accurate alignment of MRPC end cap TOF is essential for particle identification in physics analysis.
  - Each MRPC module together with FEE is mounted on the end cap of electromagnetic calorimeter (EMC).
- Use the extrapolated hit position of real middle point of each strip, the position of each module is fitted.
- The installation positions of each modules are extracted using the middle points of the raw measured time differences of each strip.
- The empirical calibration function, the time resolution of MRPC end cap TOF of BESIII has been achieved 57ps, and the efficiency of reconstruction is over 98% for electrons in Bhabha events.
- The endcap TOF detector of BESIII has been upgraded with MRPC technology in the summer of 2015, began data taking in Dec. 2015.
- The charged track extrapolation from MDC to designed end cap TOF is based on a reliable algorithm using the designed position of the detector.
- Alignment of longitudinal position of the detector is not considered in this study.
- With the empirical calibration function, the time resolution of MRPC end cap TOF of BESIII has been achieved 57ps, and the efficiency of reconstruction is over 98% for electrons in Bhabha events.
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- The difference between the two raw measured times readout from two ends of one strip is proportional to the hit position along the strip with a factor of reciprocal of effective velocity of the induced signal propagation in the strip.
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