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Barrel time-of-flight detector for the PANDA experiment at FAIR

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The PANDA experiment at the new FAIR facility at GSI will perform high precision experiments in the strange and charm quark sector using cooled beams of antiprotons at high luminosity, in the momentum range of 1.5 GeV/c to 15 GeV/c. For the identification of low momentum charged particles with extreme accuracy, the barrel time-of-flight (TOF) detector is one of the key components of PANDA. Its main requirement is to achieve a time resolution of σ<100ps as well as a large solid angle coverage at high collision rates.

The final Barrel ToF consists of 16 independent segments, located azimuthally at 50cm radial distance from the beam pipe. Every segment contains a sensitive area, that is covered by 2x60 single Scintillator Tile (SciTil). Each SciTil (90 x 30 x 5 mm^3) is read out by 4 Silicon Photomultipliers (SiPM) on both ends.

In 2016, a beam test at CERN exposed the SciTil with 6 GeV/c secondary beam where σ<60 ps time resolution was reached. In this talk we will present the further optimization of operational conditions and time resolution.

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