Strangeness physics at COSY-TOF

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The aim of this talk is to describe the future physics program at the COSY-TOF detector. The physics motivation and an overview of the instrumental capabilities are presented.

The COSY-TOF detector combines excellent tracking capability with large acceptance and full azimuthal symmetry. The tracking information, in particular close to the interaction point, allows to identify final states with strangeness with almost no background, based on the detection of the displaced decay vertices of Λ hyperons ($\Lambda \rightarrow p\pi^-$) and K_S mesons ($K_S \rightarrow \pi^+\pi^-$) as well as of the "kink" in the charged particle trajectories at the decay points of Σ^+ hyperons ($\Sigma^+ \rightarrow p\pi^0, n\pi^+$). Due to the large acceptance and the azimuthal symmetry TOF is especially suited for polarization experiments. TOF is able to measure complete angular distributions of the produced particles with small systematic uncertainty. Combining these aspects, TOF is able to measure complete Dalitz plot distributions of 3-body final states with strangeness, almost not affected by background from the much more copiously produced non-strange events.

After the upgrade with a large volume straw tube tracking system (STT) whose construction is now completed, TOF enters a qualitatively new stage of operation with significantly improved mass resolution and reconstruction efficiency, which will be combined with the polarized COSY beam.

The physics program focusses on two fundamental aspects in strangeness production with hadronic probes: Investigation of nucleon resonances and their coupling to strangeness and the spin-resolved measurement of the Λp scattering length.

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