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# Elucidating $\phi$ Meson Production from $K^+K^-$ Decay Channel in $pp@4.5$ GeV Using HADES

The High Acceptance Di-Electron Spectrometer (HADES) at GSI, Darmstadt, Germany, is an experimental setup designed to investigate hadronic matter within the realm of large net baryon densities and moderate temperatures. It achieves this through fixed-target heavy-ion collisions as well as elementary collisions with incident energies in the range of a few GeV/nucleon.

One of the recent endeavors by the HADES collaboration involves the measurement of proton-proton reactions with an incident beam energy of 4.5 GeV. Phi meson production is one of the intriguing channels that this experiment can measure, either through its decay into an  $e^+e^-$  pair or a  $K^+k^-$  pair. It remains an open question how the phi meson, primarily composed of  $s\bar{s}$  pairs according to the quark model, is produced in a proton-proton collision. The primary focus of my work is the examination of the  $\phi$  meson via its  $K^+K^-$  decay channel in the  $p(4.5 \text{ GeV})p \rightarrow ppK^+K^-$  reaction.

This talk will provide an overview of the current status of the analysis of the  $\phi$  meson channels. The analysis encompasses data collected from various detectors, including the tracking system, Mini Drift Chamber (MDC), Inner time-of-flight (iTOF), and FORWARD detector. It involves several crucial steps, such as tracking, kaon and proton identification through correlations between momentum and energy loss and relativistic velocity, background subtraction, as well as efficiency and acceptance corrections.

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