

Study of the $\omega \rightarrow \pi^0 e^+ e^-$ conversion decay with the CMD-3 detector at VEPP-2000 collider

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Measurements of the branching ratios of conversion decays are necessary to test the vector dominance model and estimate the background in the study of quark-gluon plasma. An important source of information about the physical processes occurring in a quark-gluon plasma is the production of dileptons, in particular, the production of electron-positron pairs. In experiments, the measured number of lepton pairs exceeds the theoretically predicted one.

One of the main contributions to background events in the analysis of dilepton spectrum is the conversion decays of vector mesons. In particular, ω meson decay into $\pi^0 e^+ e^-$ should be taken into account.

The study of the conversion decay $\omega \rightarrow \pi^0 e^+ e^-$ in the decay channel $\pi^0 \rightarrow \gamma\gamma$ was performed with the CMD-3 detector at the VEPP-2000 $e^+ e^-$ collider at the BINP in Novosibirsk. The analysis uses the data collected at the center of mass energy range 660 MeV - 840 MeV with total integrated luminosity of about 10 1/pb.

The main background processes are $\pi^0 \pi^+ \pi^-$ events, QED events, and $\pi^0 \gamma$ decay events, when a monochromatic photon is converted into $e^+ e^-$ pair on the material before the sensitive volume of the detector. To suppress the latter type of background, a deep neural network was used. The efficiencies of photons reconstruction, trigger, reconstruction of close tracks, and neural network application were calculated. The Born cross-section of the process under study was measured in the range 660 MeV - 840 MeV and a preliminary result was obtained for the branching ratio of $\omega \rightarrow \pi^0 e^+ e^-$. The result is twice more precise than any previous measurements.

Category

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