The 6th international conference on particle physics and astrophysics



Contribution ID: 157

Type : Poster

The search for C-noninvariant decay $\pi^0 \rightarrow 3\gamma$ and the rare decay $\pi^0 \rightarrow 4\gamma$ in NA62 (CERN) experiment

Tuesday, 29 November 2022 17:10 (120)

The aim of the poster is to demonstrate status of the work in estimation of NA62 [1] experiment sensitivity towards the search for forbidden decay $\pi^0 \to 3\gamma$ and rare decay $\pi^0 \to 4\gamma$. Current branching-ratio upper limit is 3.1×10^{-8} (90% C.L.) for the $\pi^0 \to 3\gamma$ decay and 2×10^{-8} (90% C.L.) for $\pi^0 \to 4\gamma$ decay established in Los Alamos National Laboratory [2].

 $K^+ \to \pi^+ \pi^0$ decays were used as a source of π^0 . Selection criteria for events with 3 or 4 products after π^0 decay in NA62 detector were developed. NA62 detector and all physical processes were modelled with Monte Carlo method using Geant4. Estimation of experiment sensitivity without background events consideration is 1 order better, than current upper limit for $\pi^0 \to 3\gamma$ and $\pi^0 \to 4\gamma$ decays. Background processes for both decays were studied. Main contribution in background events is $K^+ \to \pi^+ \pi^0, \pi^0 \to 2\gamma$ decay, when photon interacts with detector, and e^+e^- pair is created. Comparison of Monte Carlo simulation and experimental data was done. The estimation of number of background events inside signal region was obtained.

Literature:

- 1. Cortina Gil E., et al. The Beam and detector of the NA62 experiment at CERN // JINST 2017. V. 12. P05025
- 2. McDonough J., et al. New searches for the C-noninvariant decay $\pi^0 \rightarrow 3\gamma$ and the rare decay $\pi^0 \rightarrow 4\gamma//$ Phys. Rev. D 38(1988), 2121

Primary author(s) :GORSHANOV, Konstantin (INR RAS);SHAIKHIEV, Artur (INR RAS)Presenter(s) :GORSHANOV, Konstantin (INR RAS)Session Classification :Poster Session

Track Classification : High energy physics: experiment