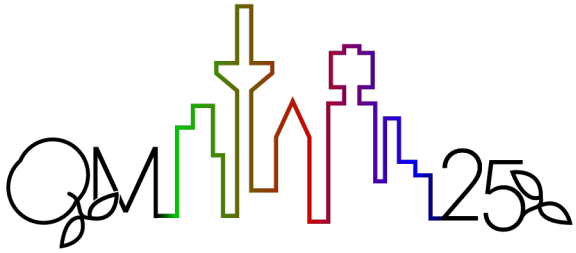

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Sensitivity Study of Dark Scalar and Dark Vector Particles in Rare Decay Channels at HIAF

Searching dark portal particle is a hot topic in particle physics frontier. We present a simulation study of an experiment targeted for searching the scalar portal particles and vector portal particles at Huizhou η factory. The HIAF high-intensity proton beam and a high event-rate spectrometer are suggested for the experiment aimed for the discovery of new physics. Under the conservative estimation, 5.9×10^{11} η events could be produced in one month running of the experiment. The hadronic production of η meson ($p + {}^{7}\mathrm{Li} \rightarrow \eta X$) is simulated at beam energy of 1.8 GeV using GiBUU event generator. We tend to search for the light dark scalar particles in the rare decay channels \(\eta \rightarrow S\pi^0 \rightarrow \pi^+ \pi^- \pi^0\) and \(\eta \rightarrow S\pi^0 \rightarrow e^+ e^- \pi^0\) and light vector portal particles in the channel \(\eta \rightarrow \gamma \gamma^* \rightarrow e^+ e^- \gamma\). The detection efficiencies of the channels and the spectrometer resolutions are studied in the simulation. We also present the projected upper limits of the decay branching ratios
of the dark scalar particle and dark vector particle and the projected sensitivities to the model parameters.

Category

Experiment

Collaboration (if applicable)

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