Workshop for young scientists with research interests focused on physics at FAIR



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Production and Dalitz decays of baryon resonances in proton-proton interaction at sqrt(s) = 3.16 GeV with HADES

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One of the main physics goals of HADES is to investigate spectral modifications of light vector mesons in strongly interacting matter via their dilepton (e+e–) decay channel. Theoretical models predict such modifications due to strong meson-baryon resonance coupling which can be also probed in elementary collisions. In 2007 electron-positron pair production has been measured in p+p reactions with beam kinetic energy of 3.5 GeV. One of the basic observables in this measurement is inclusive e+ e– mass distribution. The expected e+e– production channels are given by Dalitz decays of $\pi 0$, η , ω mesons and Δ (1232) resonance.

Indeed, the experimental data can be described by simulation of the aforementioned components, everywhere but not in the mass region below vector meson pole (M_inv \in (0.5 – 0.7)). We present analysis results of the exclusive channels pp π 0, pn π +, ppe+e–, which might indicate contributions of higher lying resonances. In order to estimate production cross sections of the baryonic resonances for hadronic channels, the results have been compared to Monte-Carlo calculations based on the resonance model assuming incoherent sum of various four stars resonances. To convert obtained resonances cross sections into e+ e– yield, two models of d $\Gamma(R \rightarrow pe+ e-)/dM(e+e-)$ are applied in the simulation.

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