Title: **Study of inclusive electron-positron pair production in collisions of Ar + KCl at 1.756 AGeV**

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Abstract: Spectroscopy of di-leptons emerging in decays of the light vector mesons ρ^0, ω, and ϕ is a promising way how to investigate changes of properties of these hadrons in the surrounding nuclear environment. This thesis deals with an analysis of inclusive e^+e^- pair emission from Ar+KCl collisions at a kinetic beam energy of 1.756 AGeV. The measurement was carried out using the High Acceptance Di-Electron Spectrometer (HADES). HADES is a unique apparatus dedicated to study e^+e^- pair production in hot and dense hadronic matter. After an introduction to the field, the HADES spectrometer is briefly described. Then we focus on the analysis of the Ar+KCl run. We describe and discuss event selection performed by the on-line trigger, lepton identification, and the subsequent pair analysis. Efficiency corrected spectra of pairs are compared with predictions of a thermal model based Monte Carlo event generator (Pluto) and, further, with forecasts of a microscopic transport code (HSD). Finally, we compare results from the HADES Ar+KCl and C+C runs. With respect to the expected di-electron yield from $\eta \rightarrow \gamma\ e^+e^-$ decay, in the invariant mass region 0.15 - 0.50 GeV/c^2, our spectra exhibit a large excess of pairs coming from other sources. Within a model dependent approach, it is shown that the total yield from this excess grows for a given size of a collision system with the beam energy similarly to π^0 multiplicity. Moreover, there is a hint that the dependence of this excess yield on the number of reaction participants is non-trivial.