Spectral Distributions of Current Correlation Functions in Baryonic Matter ◇

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We evaluate the spectrum of the isovector current-current correlation function in a nuclear medium to leading order in the baryon density. This spectrum enters directly in dilepton production rates. We demonstrate that the natural leading effect caused by the presence of baryonic matter is a significant enhancement of the dilepton rate in the continuum below the ρ meson resonance, extending down to the single pion threshold. We point out the relevance of this result in relation to the enhanced dilepton spectra seen in the CERES experiment at CERN, and to the upcoming HADES project at GSI-SIS.

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IR-Renormalon Contribution to the Polarized Structure Function g_1

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An estimation of the higher twist contribution to the polarized nonsinglet structure function g_1 is given. Its first moment is generally assumed to be small but this could be due to a cancellation of its contribution in different Bjorken-x-ranges. We estimate the magnitude of g_1^{tw4} as a function of x in the framework of the renormalon method. The calculated higher-twist-correction to g_1 turns out to be in fact small for all x values. The correction to the determination of the nonsinglet matrix element $d_{NS}^{(2)}$ from data for transversely nucleon polarization due to the calculated higher twist effects is of order 10%.

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Diffraction and Shadowing in Deep-Inelastic Scattering from Nuclei ◇

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Shadowing effects in deep-inelastic photon and lepton scattering from deuterium probe the mass spectrum of diffractive photo- and leptoproduction from nucleons. For heavier nuclear targets diffractive hadron-nucleon transition amplitudes can be studied in addition. At small $Q^2 \lesssim 1\ GeV^2$, as in the recent data from the NMC and E665 collaboration, shadowing is due to the coherent interaction of low mass vector mesons. Nuclei at HERA would yield the opportunity to investigate shadowing effects at large Q^2 where the diffractive excitation and coherent multiple interaction of heavy hadronic states is important.

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