Hard Exclusive J/ψ Leptoproduction on Polarized Targets ◇

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We consider the exclusive production of J/ψ mesons in polarized virtual-photon-proton collisions. We derive helicity amplitudes for the dominant subprocess $\gamma * g \to J/\psi g$ and show that polarization asymmetries vanish in the case of collinear scattering. Our result differs from earlier calculations of diffractive J/ψ leptoproduction, which suggested this process as a probe of the polarized gluon distribution $\Delta g(x, Q^2)$ of the proton.

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Investigation of Hadronic Properties of $S_{11}(1535)$ in Electroproduction Reactions off the Deuteron ◇

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Properties of excited baryonic states are investigated in the context of electroproduction of baryon resonances off the deuteron. In particular, the hadronic radii and the compositeness of baryon resonances are studied for kinematic situations in which their hadronic reinteraction is the dominant contribution. Specifically, we study the reaction $d(e, e'S_{11}N$ at $Q^2 \geq 1GeV^2$ for kinematics in which the produced hadronic state reinteracts predominantly with the spectator nucleon. A comparison of constituent quark model and effective chiral lagrangian calculations of the S_{11} shows substantial sensitivity to the structure of the produced resonance.

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Crossover to Non-Universal Microscopic Spectral Fluctuations in Lattice Gauge Theory ◇

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The spectrum of the Dirac operator near zero virtuality obtained in lattice gauge simulations is known to be universally described by chiral random matrix theory. We address the question of the maximum energy for which this universality persists. For this purpose, we analyze large ensembles of complete spectra of the Euclidean Dirac operator for staggered fermions. We calculate the disconnected scalar susceptibility and the microscopic number variance for the chiral symplectic ensemble of random matrices and compare the results with lattice Dirac spectra for quenched $SU(2)$. The crossover to a non-universal regime is clearly identified and found to scale with the square of the linear lattice size and with f_π^2, in agreement with theoretical expectations.

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