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Experimental physics at JLab: where confinement meets asymptotic freedom

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The Thomas Jefferson National Accelerator Facility (JLAB) is one of the most important nuclear physics laboratory in the world, where QCD is extensively investigated by means of a high intensity, longitudinally polarized, 6 GeV electron beam, which is delivered simultaneously in 3 experimental Halls.
Within the next two years, the beam energy will be doubled, a new Hall will be available for real photon physics and the equipments of the existing Halls will be upgraded or renewed.

JLAB offers the opportunity to improve our understanding of the nature of the strong interaction in the nucleus and sub-nucleon (quark and gluon) scales, at low energies as well as small distances, where QCD shows its remarkable peculiarities of confinement and asymptotic freedom. Moreover, the high luminosity achievable in the JLAB experiments and the excellent control of the beam parameters give access to the measurement of the parity violating processes of the electroweak interaction, and therefore permit the test of the Standard Model with high accuracy.

In this scientific context operates the Italian JLab12 collaboration, funded by INFN. The collaboration activities are mainly devoted to the experimental study of the inner structure and dynamics of the nucleon, the reaction mechanisms of the electron-nucleon scattering, the role of the gluon in the spectroscopy of exotic mesons and baryons, the (hyper)nuclei inner structure as well as the measurement of the nuclear/nucleon properties by means of the parity violating electron scattering.

In the talk, the JLAB facility will be introduced and some of the most interesting experiments and equipments, within the JLab12 collaboration, will be presented, stressing the challenging opportunities of the 12 GeV upgrade.

On behalf of the JLab12 collaboration

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