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The new AMBER experiment at CERN

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AMBER is a new fixed-target experiment at the CERN/SPS for the study of
Hadron Physics, thanks to a versatile beamline capable of providing muon and hadron beams over a wide energy range and a multipurpose modular spectrometer. The emergence of hadron mass phenomenom, central for our undertanding of QCD, can be experimentally addressed from the AMBER measurements of hadron radii, polarizabilities, form factors and distribution functions.

The pion and kaon induced Drell-Yan processes will be measured, providing input for the extraction of these ligh mesons parton distribution functions and studies of their transverse motion dependence. Sea to valence separation is accessed from the use of both beam charges. A measurement of direct photon production in meson-nucleon collisions allows to infer on the gluon contribution. A first-ever measurement of the kaon polarizabilities, accessed from the Primakoff reaction, complements the
characterization of kaons in the low energy regime.

A rich program on hadron spectroscopy in the light and strange meson sector is proposed. Additionally a series of unique hadron charge radii measurements are planned. The already approved high energy muon-proton elastic scattering study will address the long standing issue of the proton charge radius. The pion and kaon charge radii may be accessed from the elastic scattering on the electron cloud of target nuclei in inverse kinematics.

Finally, AMBER measures the antiproton production cross section in proton on Helium and proton on Hydrogen targets. A beam energy scan in the range 60 to 250 GeV is performed. The precise knowledge of these cross sections is a necessary input for the interpretation of antiproton cosmic fluxes in the context of Dark Matter searches.

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