Overview of JLab hadronization data

T. Mineeva

A series of measurements performed in SIDIS off D, C, Fe, Pb is presented. The data were collected during EG2 run period using CLAS detector in Jefferson Lab. The target system consisted of liquid and solid targets was exposed simultaneously to a 5.014 GeV electron beam. The main goal of the experiment is to gain insight on the parton fragmentation process as well as in-medium hadronization by measuring transverse momentum broadening (Δp_T^2) and hadronic multiplicity ratios ($R_{\rm A}^h$). These observables map the space-time evolution of the processes, which are studied in well understood nuclear medium of varying size.

Preliminary data on hadron multiplicities on nucleaus A normalized to those on deuterium are presented as a function of z_h for π^+, π^-, π^0 and K^0. Data show systematic decrease in the absolute value of $R_{\rm A}^h$ with the increase of the target mass number A as well as attenuation of hadronic multiplicities at higher values of z_h for each of the hadron species. Furthermore, data on π^+ reveal a slight increase of $R_{\rm A}^h$ with increasing Q^2 and ν. Enhancements of hadronic multiplicies as a function of Δp_T^2 (Cronin effect) are presented for π^+ and π^0. Dependence of the Cronin effect from x_B (results onπ^+) suggests attenuation behavior to be significant for the higher x_B values. Measurements of transverse momentum broadening as a function of the nuclear size $A^{1/3}$ presented for all specified hadrons show that broadening increases with mass number. Moreover, Δp_T^2 tends to be larger at hight ν values. Three dimensional transverse momentum distributions as a function of Q^2, ν, z_h are presented for π^+ and compared to the existing HERMES data. Note that CLAS data on π^- and π^0 do not yet include acceptance and radiative corrections as well as systematic uncertainities, whereas π^0 and K^0 data are acceptance corrected.

Higher energies reachable in the EIC for eA reactions give access to higher ν values, where one expects a quasifree parton to have a longer life time and (pre)hadron to be produced outside of the nucleus. Clear separation of partonic phase from the hadronic one allows to study pure partonic energy loss, which are not currently accessible in CLAS and HERMES. At small x_B, parton densities are expected to saturate. The scale of saturation is directly proportional to the transverse momentum broadening acquired at partonic stage. However, small x_B region is dominatd by multijet production. Given a large acceptance detector with fine angular resolution that enables full reconstruction of jets, one

can access saturation scale as well as physics of hard gluon jets.