decays of relatively fast light fragments, and also with the quasi-elastic knock-out of deuterons from the oxygen nucleus by proton-target.

The mean multiplicities of fragments correlate with the presence of deuterons in event. These correlations are positive for fragments with charges $Z_f \leq 4$, and negative for those with charges $5 \leq Z_f \leq 7$, which is probably connected with the conservation of baryon charge. The mean multiplicities of light fragments do not depend on mechanisms of deuteron production. CFEM does not reproduce the experimental data on production of deuterons.

References:

1. V.V. Glagolev et al. Pis'ma v JETF, 58, 497 (1993)
2. V.V. Glagolev et al. Pis'ma v JETF, 59, 316 (1994)
3. V.V. Glagolev et al. Yad. Fiz., 58, 2005 (1995)
4. A.S. Botvina, E.S. Golubeva et al., Preprint ILI AN USSR P-0657 (Moscow, 1990)

FORMATION OF PROTON-FRAGMENTS IN HADRON-NUCLEUS AND NUCLEUS-NUCLEUS COLLISIONS AT HIGH ENERGIES

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The investigation of production of protons in hadron- and nucleus-nucleus interactions is a key problem allowing one to establish the singularities of dynamics of nuclear interactions. The formation of proton-fragments at high energies of colliding particles proceeds within both the interaction of hadrons with nuclei and in the process of decay of the nucleus or its de-excitation at peripheral interactions. At different stages of interaction of impinging particle with target nucleus, the different mechanisms of formation of proton-fragments: the direct knock-out of intranuclear nucleons in the process of high energy cascade of an initial hadron, intranuclear cascade of produced particles, decay of the excited multi-nucleon fragments and of the thermalized remnant nucleus, and the coalescence of nuclear fragments to the new clusters are realized with the certain probability, connected to the interaction parameters (the interaction energy, the parameter of collision, the intranuclear density, the configuration of Fermi momentum of nucleons and clusters of target nucleus et al.). In its turn, the mechanisms of formation of the final nuclear fragments are closely related to the type of excitation of an initial nucleus. The peripheral interactions proceed at small transfers of the momentum of an impinging particle and represent the wide class of reactions covering the processes from diffractive or coulomb collective excitations of the whole nucleus to the direct quasi-elastic knock-out of the separate nucleons. Non-peripheral interactions are caused by comparatively high local transfers of momentum to the intranuclear clusters allowing the development of intranuclear cascade and the asymmetric redistribution of energy of an impinging particle. The central collisions causing the full decay of nucleus on nucleons or few-nucleon fragments, are the limiting case of the maximal development of the intranuclear cascade. The interaction of the initial particles with the massive intranuclear systems, where the nucleons are located very close to each other ($\leq$ 1 fm), may cause the appearance of the so-called "cumulative" nucleons, i.e. the nucleons with the momenta forbidden by kinematics of scattering of the particles on free nucleon. The reactions of

absorption of produced slow pions or resonances by few-nucleon systems can be one of the possible mechanisms causing the formation of the relatively energetic nucleon-fragments. As a result of these reactions, the "cumulative" protons can be produced provided that the energy of the absorbed pion or resonance is high enough.

The study of production of proton-fragments was carried out in $\pi^{-}{}^{12}C$ interactions at 4.5 and 40 GeV/c, $n^{12}C$ interactions at 7 GeV/c, $\pi^{-}Ne$ interactions at 25 and 50 GeV/c, $p^{20}Ne$ interactions at 300 GeV/c, ^{16}Op interactions at 3.25 A GeV/c. The limiting behavior of some characteristics of proton-fragments was found out in these classes of interactions for the first time. The independence of the mean multiplicity of protons with momenta 0.2 – 1.2 GeV/c and of the distributions on multiplicity from the energy of an impinging particle was established pointing out the dominating role of the processes of high energy cascade of the initial and secondary particles. The weak (or may be none) dependence of characteristics of proton-fragments from the type of the impinging particle was found out. The dependence of the mean multiplicity from the mass number has the power-like form A^n with n close to 2/3, which is characteristic for the geometrical approach.

In pNe interactions at 300 GeV/c and $\pi^{-}{}^{12}C$ interactions at 4.5 and 40 GeV/c, the presence of the structure – the deviation of the differential cross section of protons flying back in laboratory frame from the monotonous dependence in region $P_p \approx 0.3\text{-}0.5$ GeV/c in the momentum spectrum – was found out. It was shown that the observed singularity is due to the reactions of absorption of pions or meson resonances by the highly bound few nucleon systems. This phenomenon, showing up stronger at relatively small nuclei, is interpreted by the presence of the short time correlations of intranuclear nucleons. The more detailed analysis of ^{16}Op interactions at 3.25 A GeV/c showed that the structure observed at energy spectrum of protons in the range $T \approx 70\text{-}90$ MeV in the oxygen rest frame is due to the decay of two-nucleon (deuteron-like) system as a result of its absorption of the slow pion. The universal singularity was found out in the momentum spectrum of protons flying forward in the rest frame of fragmenting nucleus, expressed by an independence of mechanism of formation of these protons (excluding the "evaporated" protons) from the initial energy and the type of target-nucleus. The shape of the momentum spectrum of protons flying to the forward hemi-sphere in the rest frame of fragmenting nucleus does not depend on degree of nucleus excitation, which characterizes the extent of the intranuclear cascade. The existence of strong correlation between the shape of the momentum spectrum of proton-fragments, especially the slow ones, and the degree of excitation of the fragmenting nucleus was shown.

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PRODUCTION AND RECOMBINATION OF GLUONS

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Nonlinear Markov process of parton production has been considered. The Kolmogorov equation is applied for the evolution equation based on the approximation of independent gluons production in every decay act. We introduced a "crossing" parameter and used the combination relations to obtain nonlinear recombination equation for the evolution of gluon structure function.