Contribution ID: **140** Type: **Oral talk (15 min + 5 min questions)**

Smoking gun of nuclear clusterization in collisions of light relativistic nuclei

Friday, 15 July 2022 17:30 (20 minutes)

Interactions of C nuclei with various targets were studied in BM@N experiment at NICA [1]. Studies of O–O collisions are foreseen in future experiments after the LHC upgrade [2] as a part of a program to scan the size of colliding systems. As follows from calculations [3,4], the admixture of the alpha-clustered states in C and O leads to a triangular modulation of elliptic flow from the overlap region of colliding nuclei. It is also known [5] that forward alpha-particles are produced in fragmentation of relativistic O in nuclear photoemulsion. This suggests the impact of alpha-clusterization in O also on spectator matter. First calculations [6] of yields of secondary nuclei (He, Li, Be, B, C, N) from fragmentation of O with our Abrasion-Ablation Monte Carlo for Colliders model taking into account pre-equilibrium clusterization of spectator matter (AAMCC-MST) [7] demonstrated general agreement with data [5]. However, the production of pairs and triplets of alphas was essentially underestimated together with the production of carbon [6] with respect to measurements [5].
In order to remove this discrepancy, in the present work AAMCC-MST was extended by accounting for clustered states in nucleon configurations of initial O in addition to MST-clustering after the abrasion stage. Three nuclear density profiles in O based on [4,8] were implemented in AAMCC-MST to sample the positions of neutrons and protons in O, including one with accounting for clustered states. Results of calculations with all three profiles and with different sizes of intranuclear alpha-clusters were compared with the data on fragmentation of O [5]. While the production of alpha-particles is underestimated for all the parameterizations of nuclear densities in O, the results with the clustered nuclear density appear to be closer to the data. Further development of AAMCC-MST on the basis of the hierarchical clustering is planed.

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[2] Z. Citron et al., CERN Yellow Rep. Monogr. 7 (2019) 1159
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[4] S.H. Lim et al., Phys. Rev. C 99 (2019) 044904
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[7] R. Nepeivoda, et al., Particles 5 (2022) 40
[8] J. He et al., Phys Rev C 104 (2021) 044902

The speaker is a student or young scientist

Yes

Section

1. Intermediate and high energies, heavy ion collisions

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Session Classification: Intermediate and high energies, heavy ion collisions