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## Analysis of tracks of emerging particles in the BM@N experiment of the NICA accelerator complex in a mathematical model of fractal thermodynamics.

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In the BM@N experiment, a xenon heavy ion beam with an energy of 2.7 GeV/nucleon interacts with a cesium target, generating many secondary particles  $\pi$ ,  $\mu$ ,  $p$ ,  $n$ ,  $\gamma$ ,  $e$ ,  $d$ ,  $\alpha$ ,  $K$ , etc. After computer processing of the data from the detectors used in the experiment, we obtain a series of images of the tracks of emerging particles. We processed four of them using the Gwyddion program and calculated the value of the deviations of the set of tracks from the fractal  $\delta$ . Они составили  $\delta_1 = 0,01738$ ,  $\delta_2 = 0,01574$ ,  $\delta_3 = 0,01862$ ,  $\delta_4 = 0,01574$ , то есть менее 2%. Since all the values of  $\delta$  turned out to be sufficiently small, the structure of the set of tracks of produced particles is close to fractal. For all four patterns, the fractal parameters  $S_f$ ,  $D$ ,  $T_f$  of the set of tracks of produced particles are determined. Based on these data, diagrams of fractal states  $S_f(T_f)$  were constructed. The indices of fractal equations of state (FOS) of the studied sets were calculated in the mathematical model of fractal thermodynamics [1].

1. E.K. Paramonova, A.N. Kudinov, S.A. Mikheev, V.P. Tsvetkov, and I.V. Tsvetkov. Fractal Thermodynamics, Big Data and its 3D Visualization, Proceedings of the 9th International Conference "Distributed Computing and Grid Technologies in Science and Education" (GRID'2021), Dubna, Russia, July 5-9, 2021

### Summary

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