

Collision of two composite particles

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We study scattering process of the particles, with the inner degrees of freedom. We found the significant differences of this process from the scattering of structureless particles. We use the billiard approach for our research. It is possible to move from the complex N-body problem to the much simpler problem of a moving particle in the N-dimensional billiard. In the result, it was shown that the scattering of composite particles are inelastic despite the fact that the collisions between separate components are elastic.

We consider the important case of collision of a composite particle with one inner degree of freedom and a structureless particle. We find the scatter matrix, the scatter time and the full number of collisions. It was shown, that the restitution coefficient in a general case are different from 1. Moreover, in contrast to macroscopic bodies, its value may even exceed 1. This is due to "cooling" of the internal degrees of freedom of a composite particles. The reverse effect is possible too. Under the certain conditions, restitution coefficient can be close to zero. Also we consider the case of the collision of two composite particles. We show that for such case, the set of possible modes of scattering is the same as in the previous case. The upper limit of the scattering time and the number of collisions between the composite particles was taken.