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Section:

11. Mathematical Physics

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Poincare models, rigorous justification of the second law of thermodynamics on the basis of mechanics, and the Fermi acceleration mechanism

The second law of thermodynamics and Fermi acceleration problem are rigorously proved on the basis of mechanics taking account of the relativistic effect. The proofs use essentially the ergodic theory, Poincare models of one and three dimensional gas, relativistic analogue of Fermi-Ulam model [1] and the solution of Fermi-Ulam problem which at first was given in [2].
Reference: [1] L. D. Pustyl'nikov, Poincare models, rigorous justification of the second element of thermodynamics on the basis of mechanics, and the Fermi acceleration mechanism, Uspekhi Mat. Nauk 50:1 (1995), 143-186; English transl. in Russian Math. Surveys 50:1 (1995), 145-189. [2] L. D. Pustyl'nikov, On a problem of Ulam, Teoret. Mat. Fiz.57 (1983), 128-132; English transl. in Theoret. and Math. Phys.57 (1983).