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Simulation of light antinucleus-nucleus interactions

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Main assumptions of simulation of antiproton and light antinucleus interactions with nuclei are presented. Cross sections of scatterings of the antiparticles by protons and nuclei in the energy range from 100 MeV/c to 1000 GeV/c per anti-nucleon are calculated in the Glauber approximation which provides an excellent description of all known antiproton-nucleus cross sections. The results were obtained using a new parameterization of total and elastic antiproton-proton cross sections. Problems of a soft antinucleon-nucleon interaction are considered within the Quark-Gluon-String model.
The model is a combination of the Regge phenomenology, quark ideas and 1/Nf expansion of QCD. A good description of antiproton-proton interaction channels has been reached, and a Monte Carlo program for event simulation of the interactions is proposed.

It is observed that differential cross sections of elastic antiproton-nucleus and antinucleus-nucleus scatterings are well described by the strong absorption model. The model is also applicable to antiproton-proton scattering data as well as to proton-proton ones.

A package of computer codes for calculations of the cross sections and simulations of elastic and inelastic antiproton and antinucleus scatterings by protons and nuclei has been created and included in the Geant4 simulation toolkit.

Primary author: Dr GALOYAN, Aida (Joint Institute for Nuclear Research, Dubna)

Co-author: UZHINSKY, Vladimir (CERN)

Presenter: Dr GALOYAN, Aida (Joint Institute for Nuclear Research, Dubna)

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