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SIBYLL 2.3 and MCEq, a customizable numerical solver for atmospheric lepton fluxes

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The precision of atmospheric lepton flux calculations is limited by various factors. One source of uncertainty is the parameterization of the primary cosmic ray flux. Typically, calculations are performed for a single atmospheric profile, approximating either a global atmosphere or one specific location. The control of uncertainties arising from hadronic interaction models is the most challenging part of these calculations. We have created an updated version of popular multi-purpose event generator SIBYLL, employing recent accelerator data together with atmospheric lepton measurements in the development process. It contains a model for production of charm quarks and it is thus tailored to the particular needs of current astroparticle physics research. The matrix cascade equation (MCEq) program is an open-source code for numerical calculations of the atmospheric muon and neutrino flux. The open-source code allows users to calculate fluxes in very high speed, using custom or pre-defined parameterizations of the primary cosmic-ray spectrum/composition and arbitrary atmospheric profiles. We will use this code to discuss inclusive lepton fluxes calculated with the current version of SIBYLL.

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