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Collision modelling in air showers and accelerators

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A high energy cosmic particle entering the atmosphere interacts with air, initiating a so-called hadronic cascade of mostly pions, but also kaons, protons, and others. Some hadrons (like the neutral pion) decay into photons, which leads to an electromagnetic cascade of electrons, positrons, and photons. A good theoretical understanding of the dynamics of these two types of cascade is crucial for a realistic simulation of a complete air shower, which is the basis of a correct interpretation of experimental results. In particular, having measured properties of air showers, one wants to conclude about the energies and the chemical compositions of the incident particles. Can we perform realistic simulations? The electromagnetic cascade is theoretically well under control, whereas the hadronic cascade relies on phenomenological models, which have to be tested against data from accelerator experiments in an energy range from few GeV up to the highest available energies. We will discuss the current status of collision modelling and in particular in which way certain results from accelerator experiments affect the interpretation of cosmic ray data, and vice versa.