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Status of the novel CORSIKA 8 air shower simulation framework

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The simulation program CORSIKA is the leading tool for the research in air shower physics for over 30 years. It is recently undergoing a huge development effort, driven by the migration from FORTRAN77 to modern C++17, in order to achieve the highest performance and functionality, deploying parallelism and engaging different platforms like GPU and many-core CPU, using efficient and multithread-ready techniques. The radio emission framework within CORSIKA 8 is, for example, designed to work in a model-agnostic way which will allow for the first time to in-depth compare all possible emission models. CORSIKA 8 is also a platform to develop novel algorithmic solutions, e.g. generative networks. A status report and near-term outlook of the project is given. Some ongoing important design choices, like output management and the simulation of showers in different media, are also highlighted and illustrated with an exotic application to cosmic-ray showers in the Martian atmosphere. Moreover, the first examples and comparisons with previously existing codes are presented. The roadmap to a first physics production release is presented.

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