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Simulating radio emission from air showers with CORSIKA 8

CORSIKA 8 is a new framework for air shower simulations implemented in modern C++17, based on past experience with existing codes like CORSIKA 7. The flexible and modular structure of the project allows the development of independent modules that can produce a fully customizable air shower simulation. The radio module in particular is designed to treat the signal propagation and electric field calculation to each antenna in an autonomous and flexible way. It provides the possibility to simulate simultaneously the radio emission calculated with two independent time-domain formalisms, the "Endpoint formalism"as implemented in CoREAS and the "ZHS"algorithm as ported from ZHAireS. Future development for the simulation of radio emission from particle showers in complex scenarios, for example cross-media showers penetrating from air into ice, can build on the existing radio module, re-using the established interfaces. In this work, we will present the design and implementation of the radio module in CORSIKA 8, and show a direct comparison of radio emission from air showers simulated with CORSIKA 8, CORSIKA 7 and ZHAireS.

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