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Conservative large-angle collision operator for runaway avalanches OLA EMBRÉUS, ADAM STAHL, EERO HIRVIJOKI, TÜNDE FÜLÖP, Chalmers Univ of Tech — Avalanche runaway generation is the phenomenon whereby runaway electrons (REs) are generated due to large-angle collisions of thermal electrons with existing REs, leading to an exponential growth of the runaway current. These large-angle collisions are not described by the Fokker-Planck operator commonly employed to model collisions in plasmas, and have previously been accounted for by the addition of a particle source term in the kinetic equation [M. Rosenbluth et al., 1997, Nucl. Fusion 37, 1355; S. C. Chiu et al. 1998, Nucl. Fusion 38, 1711]. In this contribution we describe a new large-angle collision operator, derived as the high-energy limit of the linearized relativistic Boltzmann collision integral. This operator generalizes previous models of large-angle collisions to account for the full momentum dependence of the primary distribution and conserves particle number, momentum and energy, while also avoiding double counting of small- and large-angle collisions. The new operator is implemented in the 2D Fokker-Planck solver CODE [M. Landreman et al. 2014, Comp. Phys. Comm. 185, 847], with which we investigate its effect on the evolution of the runaway distribution.

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