## EFFICENT SIMULATION OF ULTRA-HIGH ENERGY AIR SHOWERS

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We have developed a fast and efficient one-dimensional method to calculate the development of extensive air showers. This method allows us to simulate ultra-high energy showers with very high statistics. It is based on pre-calculated pion induced showers and a bootstrap technique, accounting for fluctuations in the electromagnetic and muonic components. As a first application of this code we consider in detail the longitudinal shower development and the number of muons at observation level as predicted by different hadronic interaction models. The relation between the various assumptions in modeling hadron production, in particular its extrapolation to ultra-high energy, and extensive air shower observables is discussed.