Muon Monte Carlo: a new high-precision tool for tracking of muons in medium

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Propagation of muons through large amounts of matter is a crucial necessity for analysis of data produced by muon/neutrino underground experiments. A muon may sustain hundreds of interactions before it is seen by the experiment. Since a small uncertainty, introduced hundreds of times may lead to sizable errors, requirements on the precision of the muon propagation code are very stringent. A new tool for propagating of muon and tau leptons through matter that is believed to meet these requirements is presented here. The latest formulae available for the cross sections were used and the reduction of the calculational errors to minimum was our top priority. The tool is a very versatile program that written in an object-oriented language environment (Java). It supports many different optimization (parametrization) levels. Fully parametrized version is as fast or even faster than the competition. On the other hand, the slowest version of the program that does not make use of parametrizations, is fast enough for many tasks if queuing or SYMPHONY environments with large number of connected computers are used. An overview of the program is given and the results of its application to the muon detectors (AMANDA and Frejus) are discussed.