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pymcabc: A Particle Physics Toy Toolbox for the ABC Model

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We present the pymcabc software which is a High Energy Physics toy toolkit for the ABC model. The ABC model is a pedagogical model that consists of three scalar particles of arbitrary masses. The only interaction among these particles occurs when all three of them are present together. The pymcabc software can calculate all the leading-order cross-sections as well as decay widths within the ABC model. The software can be used as an Event Generator to simulate all the scattering processes within the ABC model. Moreover, it simulates the decays associated with the heavy-particle final state, leading to a $2 \rightarrow 3$ or a $2 \rightarrow 4$ type final states within the ABC model. We also apply toy gaussian detector effects to simulate the detector response of a toy tracker for three-momentum measurements and a toy calorimeter for energy measurements. Using the results of the pymcabc software, we have also illustrated some well-known physics analyses techniques such as the analysis of the lineshape of a heavy propagator and recoil mass reconstruction.

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