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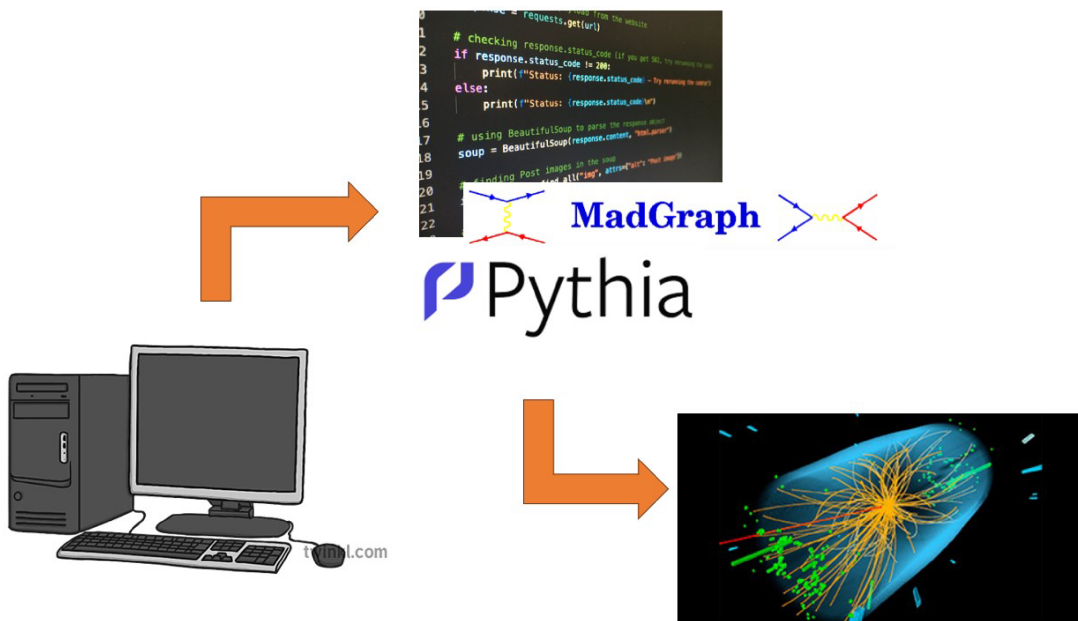
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Use of software chains to simulate and test BSM models.

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The Standard Model of Particle Physics (SM) is a set of theories that describes the structure of matter and its dynamics. Currently, the SM is the most successful theory for understanding the elementary structure of matter, and its interactions, with good agreement with experimental results. Although its success, the SM has some problems and is not yet a complete description of nature. For instance, it does not describe gravity, dark matter, dark energy, and neutrino masses. So, studying models Beyond the Standard Model (BSM), and their predictions, is an important step in order to advance in the field of particle physics.

To delve into the study of BSM theories, one approach involves simulating BSM events. To accomplish this, a suite of specialized software tools is available, enabling the generation and simulation of particle collisions. For example, it is possible to integrate software packages like MadGraph and Pythia, allowing the simulation of particle collisions. Through this software chain BSM process can be generated, analyzed, and then compared to the theoretical models.



MadGraph is designed to calculate and generate Feynman diagrams and matrix elements for a wide range of particle physics processes involving the interactions of elementary particles. It can generate processes, do matrix elements calculations, cross-section calculations, and generate events. Pythia is a Monte Carlo event generator used to simulate particle events, it is commonly used to simulate the outcome of collisions.

This software chain is an important computational approach to studying such models and is widely used in BSM research.