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Automated wave-set generation in three-pion final states

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The measurement of the excitation spectrum of light-quark hadrons often requires to apply partial-wave analysis methods. The building blocks of the physical models used in such analyses are the partial waves, which describe the quantum numbers and the decay paths of the resonances. In diffractive reactions, in principle, infinitely many of these waves can contribute. However, for finite data samples, only a finite number of waves carry relevant information. Finding these waves is in general a difficult task. We present a method that imposes constraints in the form of prior probability density functions on the individual waves in order to build sparse models from systematically constructed sets of possible partial waves. As an example, we show results of the application of this method to simulated data for diffractively produced $\pi^-\pi^-\pi^+$ events.

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