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Energy Flow and Jet Substructure

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I will discuss a set of observables, the Energy Flow Polynomials (EFPs), which form a complete, linear basis for IRC-safe observables. I will demonstrate that, on the problems of quark/gluon discrimination, boosted W tagging, and boosted top tagging, the performance of EFPs with linear classification is comparable to that of complex, modern machine learning techniques. Efficient computation of the EFPs is vital to their practical use, and I will develop novel algorithms that make use of the graph-theoretic interpretation of EFPs to improve their computational complexity over that of an arbitrary N -particle energy correlator. Finally, I will introduce the Energy Flow Moments (EFMs), tensors that allow for all EFPs to be computed in time linear in the multiplicity, and discuss how EFMs can be used to understand redundancies in the energy flow basis.

Authors: KOMISKE, Patrick (Massachusetts Institute of Technology); METODIEV, Eric (Massachusetts Institute of Technology); THALER, Jesse (MIT)

Presenter: KOMISKE, Patrick (Massachusetts Institute of Technology)

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