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Jet SIFT-ing: A Scale Invariant Jet Clustering Algorithm for the Substructure Era

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We describe a new jet clustering algorithm (SIFT: Scale-Invariant Filter Tree) that does not impose a fixed cone size or associated scale on the event. This construction maintains excellent object discrimination for very collimated partonic systems, tracks accrued mass, and asymptotically recovers favorable behaviors of both the standard KT and anti-KT algorithms. It is intrinsically suitable (without secondary declustering) for the tagging of highly boosted objects, and applicable to the study of jet substructure. Additionally, it is resilient to pileup, via a concurrent filter on soft wide-angle radiation applied within the primary clustering phase. Flexible termination conditions facilitate clustering to a fixed number of objects or identification of the "natural" object count. Linearithmic performance can be achieved through a new neighbor-finding framework based on the KDTree data structure that is compatible with higher-dimensional measures and "sociophobic" coordinates. Clustering histories are visualized in time with video simulation (we have movies!).

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