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Safely Eating Junk: Pileup and Infrared Radiation Annihilation (PIRANHA)

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Jet grooming is an important strategy for analyzing relativistic particle collisions in the presence of contaminating radiation. Most jet grooming techniques introduce hard cutoffs to remove soft radiation, leading to discontinuous behavior and associated experimental and theoretical challenges. In this talk, I introduce Pileup and Infrared Radiation Annihilation (PIRANHA), a paradigm for continuous jet grooming which overcomes the discontinuity and infrared sensitivity of hard cutoff grooming procedures. I motivate PIRANHA from the perspective of optimal transport and introduce a tree-based, computationally inexpensive implementation of PIRANHA called Recursive Subtraction. Finally, I demonstrate the performance of Recursive Subtraction in mitigating sensitivity to soft distortions, such as hadronization and detector effects, and additive contamination from pileup.

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