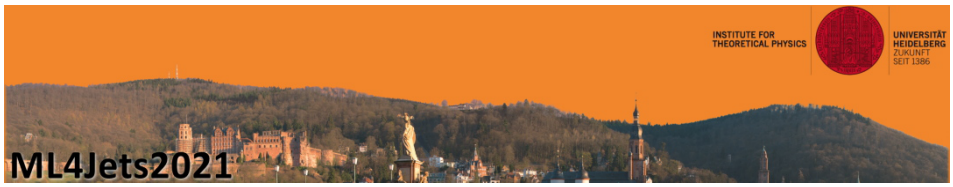

Contribution ID: **14** Type: **not specified**

Linearized Optimal Transport for Jet Physics

Tuesday, 6 July 2021 10:20 (20 minutes)

Optimal Transport has been applied to jet physics for the computation of distance between collider events. Here we generalize the Energy Mover's Distance to include both the balanced Wasserstein-2 (W2) distance and the unbalanced Hellinger-Kantorovich (HK) distance. Whereas the W2 distance only allows for mass to be transported, the HK distance allows mass to be transported, created and destroyed, therefore naturally incorporating the total pt difference of the jets. Both distances enjoy a weak Riemannian structure and thus admit linear approximation. Such a linear framework significantly reduces the computational cost and in addition provides a Euclidean embedding amenable to simple machine learning algorithms and visualization techniques downstream. Here we demonstrate the benefit of this linear approach for jet classification and study its behavior in the presence of pileup.

Affiliation

Department of Physics, University of California, Santa Barbara

Academic Rank

PhD student

Primary author: Ms CAI, Tianji (Department of Physics, University of California, Santa Barbara)

Co-authors: Ms CHENG, Junyi (University of California, Santa Barbara); Prof. CRAIG, Nathaniel (Department of Physics, University of California, Santa Barbara); Prof. CRAIG, Katy (Department of Mathematics, University of California, Santa Barbara); Prof. SCHMITZER, Bernhard (CAMPUS INSTITUTE DATA SCIENCE, UNIVERSITAT GOTTINGEN, GOTTINGEN, GERMANY); THORPE, Matthew (DEPARTMENT OF MATHEMATICS, UNIVERSITY OF MANCHESTER, MANCHESTER, UK)

Presenter: Ms CAI, Tianji (Department of Physics, University of California, Santa Barbara)

Session Classification: New architectures