

Theory and computation highlights in May, 2023  
(Contribution to the Director's Monthly Report to JSABOD)  
June 15, 2023

INFRARED-COLLINEAR SAFE JET CLASSIFICATION: Machine learning-based jet and event classifiers have been able to achieve impressive performance and significantly outperform traditional methods. In order to understand the patterns and the physics that the machine is able to learn, Dr. Felix Ringer and colleagues have introduced [arXiv.org:2305.08979] new classifiers -- jet flow networks -- where particles are first clustered into infrared-collinear (IRC) safe subjects. The new classifier can match its IRC-unsafe counterpart, indicating that the machine-learned information can be mapped to a human-interpretable space of observables that is tractable in perturbative QCD. Several applications are foreseen to high-energy nuclear and particle physics, including studies of hadron structure at the future Electron-Ion Collider.

NUMBER DENSITY INTERPRETATION OF DIHADRON FRAGMENTATION FUNCTIONS: A recent paper [arXiv.org:2305.11995] by Dr. Nobuo Sato and collaborators presents a new quantum field-theoretic definition of fully unintegrated dihadron fragmentation functions (DiFFs), as well as a generalized version for the n-hadron fragmentation functions. Unlike previous versions, this definition has a number density interpretation. Within the new framework, DiFFs extracted from experimental measurements will have a clear physical meaning and allow for the calculation of relevant expectation values.