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Title: Learning Physics from Gaia

Abstract:

In this talk I will present my recent work on building a method to derive analytical relations from physical data (https://arxiv.org/abs/2303.03192). Our algorithm, which we built with the superb 6-dimensional Gala data in mind, is the first deep learning method that uses physical units to help inform the generation of proposed equations. I will show the great benefits of this approach, and show some examples of what the method is capable of, and discuss future developments and applications to Gaia.

I will also take this opportunity to present briefly our recent discoveries of stellar streams in Gaia DR3, including a fascinating example of a stream with a pericenter in the distant 100kpc halo which passes through the Solar neighbourhood (Tenachi et al. 2022, ApJ 935, 22), and hints at the possibility of an "Oort cloud"-like structure of satellites around the Milky Way.