Contribution ID: **92** Type: **Contributed talk**

Detection of open cluster rotation fields from Gaia DR3 proper motions

Wednesday, 6 September 2023 09:15 (15 minutes)

Most stars from in groups which with time disperse, building the field population of their host galaxy. In the Milky Way, open clusters have been continuously forming in the disk up to the present time, providing it with stars spanning a broad range of ages and masses. Observations of the details of cluster dissolution are, however, scarce. One of the main difficulties is obtaining a detailed characterization of the internal cluster kinematics, which requires very high quality proper motions. For open clusters, which are typically loose groups with some tens to hundreds of members, there is the additional difficulty of inferring kinematic structures from sparse and irregular distributions of stars.

In this work, we seek to map the internal stellar kinematics of open clusters, and identify rotation, expansion or contraction patterns. To this end, we use Gaia (early) Data Release 3 (eDR3) astrometry and Integrated Nested Laplace Approximations to perform vector-field inference and create spatio-kinematic maps of 1237 open clusters with available lists of members.

We report the detection of rotation patterns in a 8 open clusters, with some additional clusters display possible rotation signs. We also observe 14 expanding clusters, with over 10 other objects showing possible expansion patterns. Contraction is identified in 2 clusters, with 1 additional cluster presenting a more uncertain detection. In total, 53 clusters are found to display kinematic structures. Within these, elongated spatial distributions suggesting tidal tails are found in 5 clusters.

These results indicate that the approach developed here can recover kinematic patterns from noisy vector fields, as those from astrometric measurements of open clusters or other stellar or galactic populations, thus offering a promising probe for exploring the internal kinematics and dynamics of these types of objects.

Primary author: MOITINHO, André (CENTRA - University of Lisbon)

Co-author: Dr KRONE-MARTINS, Alberto (UCI)

Presenter: MOITINHO, André (CENTRA - University of Lisbon)

Session Classification: WG2. The Life and Death of Stars (III). Chair: André Moithino.