Title:	Understanding the disk morphology using open Star Clusters and other Tracers in the milky Way
Authors:	Malhotra, Sagar
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Abstract:	The understanding of the Milky Way has undergone immense progress with the advent of Gaia, and new Open Star clusters (OCs) being discovered with precise physical parame- ter estimations using the unprecedented astrometric and photometric data available for over a billion stars in the Gaia Archive. Further, studying the distribution of different stellar pop- ulations has proven useful in extracting interesting insights into the formation and evolution of the Milky Way Galactic disk. The recent release of Gaia DR3 in June 2022 motivates us to re-investigate the properties and the structure of our Galaxy while making use of updated catalogs compiled from multiple references in the literature. As OCs are excellent tracers to probe the structures in the Galactic disk, we compile a catalog of more than 6,000 OCs analyzed in the post-Gaia era and use their physical and kinematic parameters to study the morphology of the Galactic disk in addition to the kine- matics of Milky Way spiral arms. Further, we also study other stellar populations such as classical cepheids, pulsars and hot luminous stars to infer the properties of the Galactic warp and estimate the solar offset from the Galactic plane. It was found that the determination of solar offset is sensitive to the type and the typical age of the tracer population used. We conclude the thesis by attempting to use a clustering algorithm to update the membership lists of OCs in Gaia DR3 and homogeneously estimate their physical parameters. We hope that this work will motivate towards improving the current census of Galactic tracers and using them to study the dynamical and, in some cases, chemical evolution of the Galaxy over time.
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