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# Deciphering the dynamics of the Milky Way spiral arms from Gaia.

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## 1 Abstract

The unprecedented data from the Gaia mission has allowed us to reveal in detail the non-axisymmetric velocity field of the Milky Way disk. However, devising a precise model of the underlying non-axisymmetric components is far from trivial. Using the conservation of the distribution function in infinitesimal phase-space patches following the Hamiltonian flow allows one to compute the current distribution function by integrating orbits backward in time to an axisymmetric equilibrium state. In this talk, I will show how we explored the vast parameter space of the bar and spiral arms with this method to establish the current most realistic dynamical non-axisymmetric model for the Milky Way Disk. In particular, our best-fit model, has two spiral arms modes, one 2-arms mode describing Scutum-Local-Outer arms with a slow pattern speed, and another 3-arms mode describing Sagittarius-Carina-Perseus arms with a slightly higher pattern speed. Further, we discuss the moving groups and the insights found on their association with the resonances of the bar and/or spiral arms.