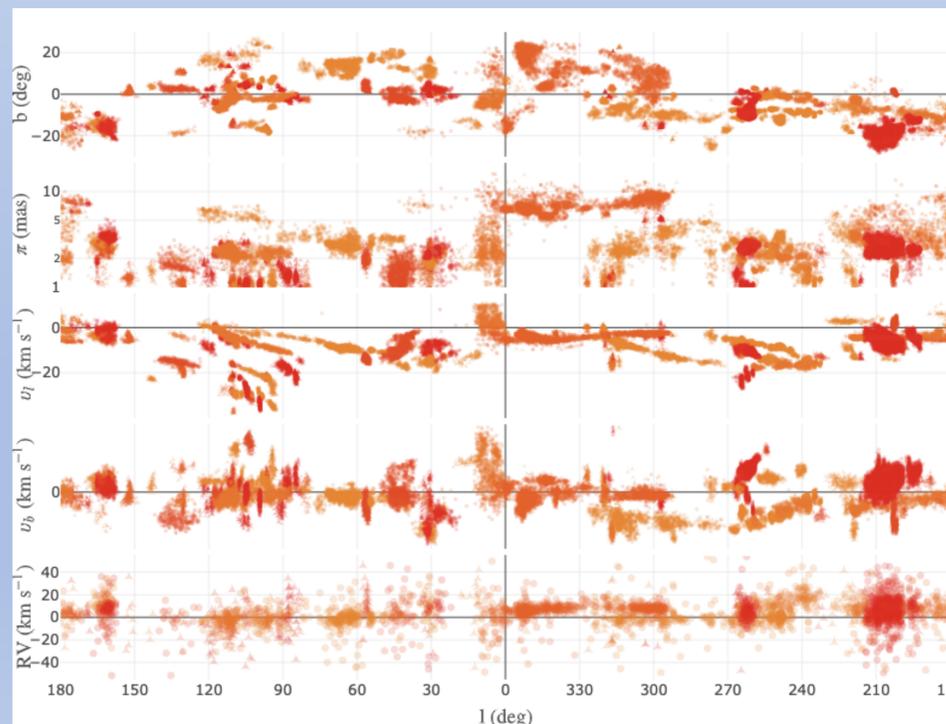
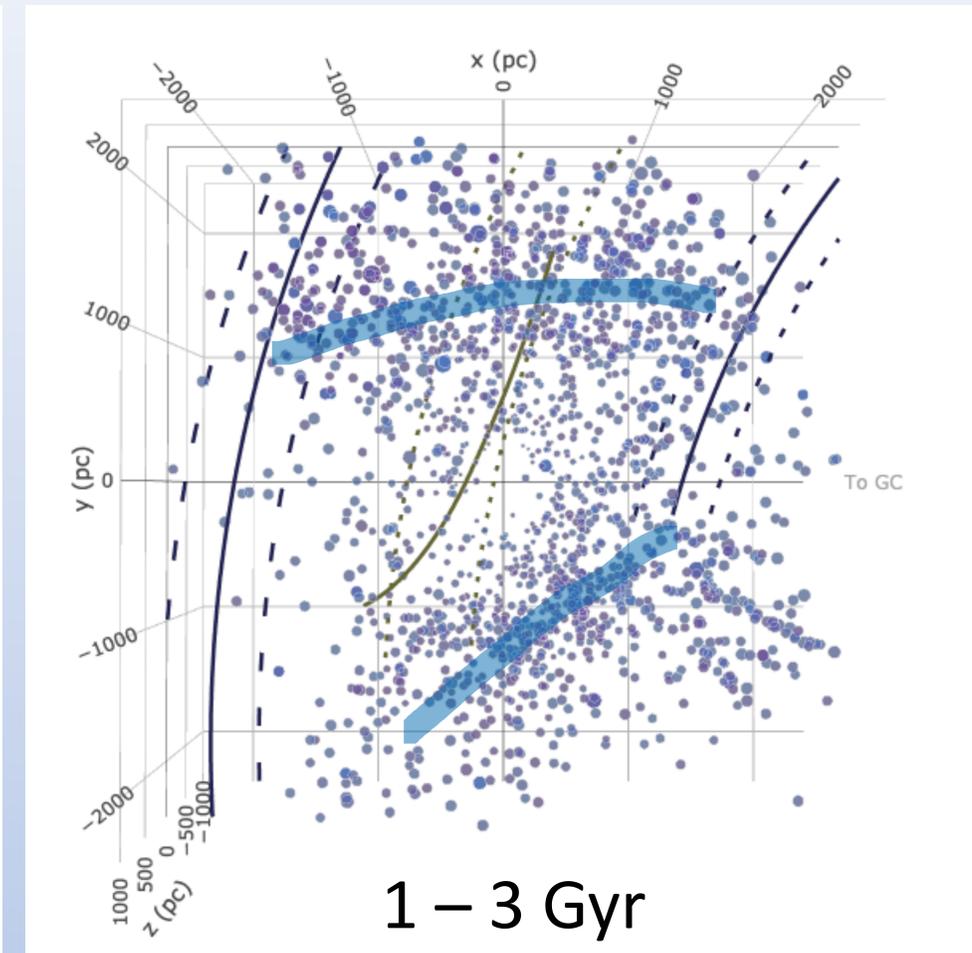
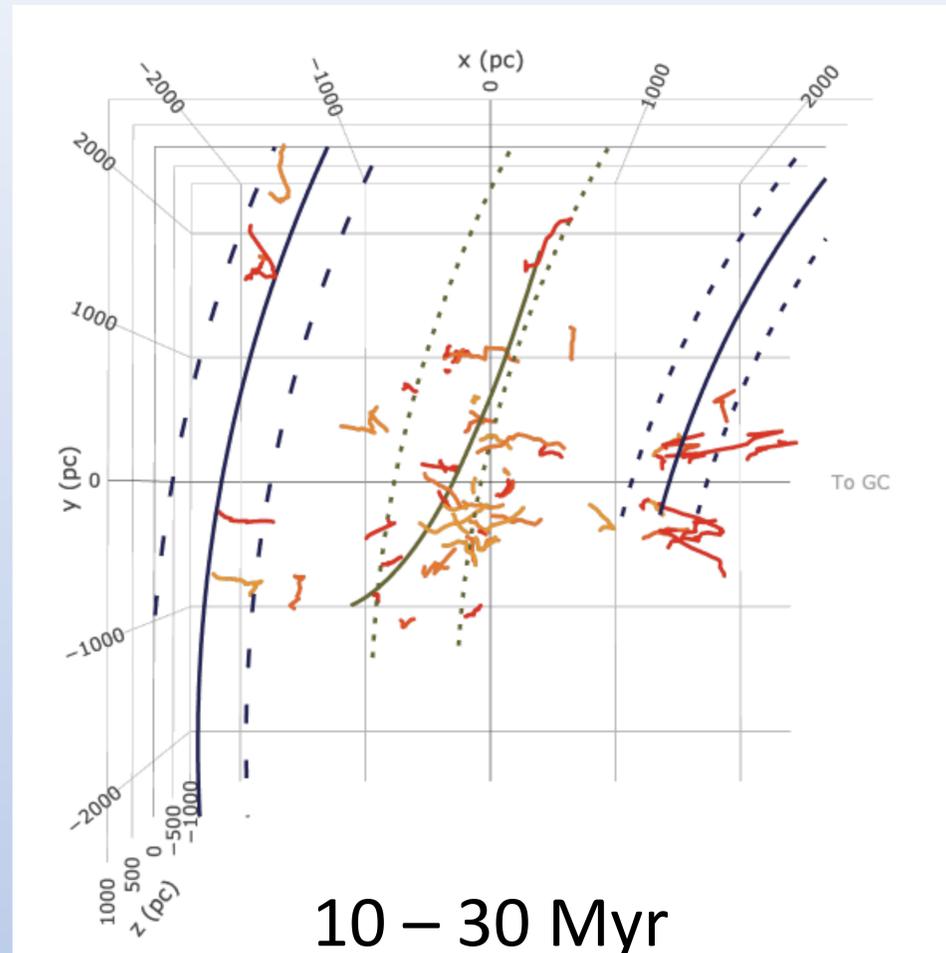
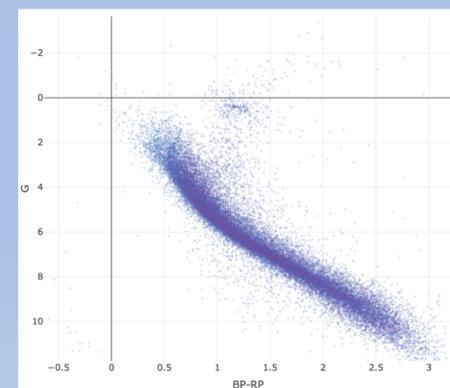
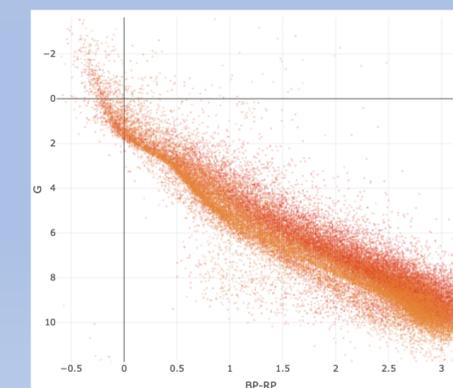


Most stars form in primordial string-like populations, some persisting up to 1 Gyr. While still young, these strings tend to be oriented perpendicular to the spiral arms

- Gaia DR2 provides unprecedented precision in measurements of the distance and kinematics of stars in the solar neighborhood, allowing for a systematic search for open clusters and moving groups.
- Using HDBSCAN we perform hierarchical clustering of the Gaia data, identifying overdensities in 3d positions + proper motions.
- In total, identified >8000 populations containing close to 1 million stars.
- As stars co-moving groups have likely formed at the same time, it is possible to measure their age through isochrone fitting. We developed a neural network-based code [Auriga](#) to assist with autonomous age determination using Gaia+2MASS photometry.
- We identify a number of populations that are string-like, mirroring a shape of filamentary molecular clouds from which these strings likely have formed.
- They are not a result of tidal stretching of compact clusters
- Such strings are ubiquitous among young stars, but they tend to relax into the Galaxy after 100 Myr, leaving behind the densest, most-clusterlike parts to still remain comoving.
- Young strings tend to be perpendicular to the spiral arms. They can be analogous to gaseous feathers observed in more distant galaxies. This points to the feathers being the dominant form of the giant molecular cloud assembly.
- The present day spiral arm structure loses cohesion at the age of 100 Myr. At older age ranges, however, populations periodically show various overdensities in their 3d distribution. Such overdensities may be signatures of ancient spiral arms as they have existed when these populations were just forming.



- Fig 1 (top): spatial distribution of identified population. Note the difference in the preferred orientation of structure traced by the populations in the different age bins.
- Fig 2 (left): young populations across different portions of phase space. The filamentary morphology of strings is sharply defined in all parts of phase space.
- Fig 3 (bottom): HR diagrams of different populations



Links to interactive [HR diagram](#), [2d](#) & [3d](#) plots