

### [GC-35] Warp Characteristics of Spiral Galaxies in the Virgo Cluster

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Warp phenomenon seems to be ubiquitous among spiral galaxies, and a number of mechanisms have been suggested as the origin including cosmic infall and tidal interactions. In this work, we compare warp characteristics of cluster spirals and the ones in the field in order to investigate the influence of environment on warping, in particular of gas disks. We make use of a tilted-ring modeling (TRM) method to VLA HI (21cm) data cubes of carefully selected 20 spiral galaxies in the Virgo cluster. The TRM allows us to probe kinematics, e.g., inclination, position angle, and velocity dispersion of HI disks. We compare the properties of each tilted-ring component to mean properties based on optical images. In this contribution, we present preliminary yet important findings on the warp characteristics of spiral galaxies in dense environment, and discuss possible origins of those kinematical structures.

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### [GC-36] Environmental Effects on the Molecular Gas Properties of Cluster Spirals

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It is well known that the cluster environment can change the atomic gas properties of galaxies through tidal interactions and/or by the hot cluster medium. Meanwhile, the molecular gas is expected to be less vulnerable to its surroundings due to its higher density, and no obvious influence of the environment on the molecular gas properties had been found among cluster spirals until recently. However, in a recent study by Fumagalli et al. (2009) of a sub-sample of Virgo spirals, it has been suggested that HI deficient galaxies can be also CO deficient. In order to further investigate if the HI deficiency indeed can result in the deficiency in molecular gas content, we compare the global CO and HI gas properties of Virgo spirals with those of galaxies in the Ursa Major cluster and the Pisces cluster, much lower density environments than Virgo. We discuss possible consequences of molecular gas deficiency in star formation activity of spiral galaxies in high density environment.