

[GC09] The Alignments of Disk Galaxies with the Local Pancakes

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We analyze the Tully catalog of nearby galaxies to investigate the local pancaking effect on the orientation of disk galaxies. We first select only those edge-on disk galaxies in the catalog whose axis-ratios are less than 0.1 to measure their spin axes unambiguously. A local pancake at the location of each selected galaxy is found as a plane encompassing the two nearest neighbor disks. Then, we examine statistically the inclinations of the galaxy spin axes relative to the local pancake planes. It is detected that the Tully disk galaxies tend to be inclined onto the local pancake planes, and the average inclination angles decrease with the pancake scale. We also construct a theoretical model for the inclination of disk galaxies relative to the local pancakes in the frame of the linear tidal torque theory. The comparison of the theoretical prediction with the observational result demonstrates a good agreement. Finally, we conclude that it is a first detection of the local pancaking effect on the orientation of disk galaxies, which is consistent with the scenario that the gravitational tidal field promotes the formation of pancakes on small mass scale.

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