[GC07] Properties of tidally-triggered Spiral densiy Wave and Gas Response

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We study properties of spiral density wave in a disk galaxy which is generated by tidal interaction with a companion. We have used GADGET to simulate tidal encounters between galaxies. The disk galaxy is assumed to be infinitesimally thin and consists of live stellar and gaseous disks which are embedded in halo and bulge potential. We vary the strength of the tidal interaction by controlling the perigalacticon distance (at t=0), R_p=25, 35, or 45 kpc and the companion's mass, M_p=10 or 20% of the galaxy mass, M_g. Two-armed global spiral density wave is excited between the inner Lindblad resonance and the corotation radii. The arm pitch angle, i is approximately constant at a given epoch over a long range of galactic radius. The arm is open ($i \approx$ 20-45°) at the beginning but winds up to be $i \approx 6°$ in 2 Gyr for all cases. The pattern speed decreases slowly with radius, ranging from 5 to 10km/s/kpc without showing dependency on the tidal interaction. For the strongest encounter (R_p=25 kpc and M_p/M_g=20%), the arm strength F, defined by the ratio of the perturbed gravitational force to the background axisymmetric force, reaches its maximum F~17% at t=0.2 Gyr. The very strong arm (eg. F>10%) is transient and seems to hardly last longer than 0.5 Gyr. The gaseous disk also develops spiral arms due to stellar potential. For strong encounters, spiral shock is formed along the stellar arm. Spur-like substructure is developed when F>10%, but its property is not consistent with observations.

[GC08] Esimating Triaxial Mass distribution of Virgo Cluster

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We reconstruct the intrinsic triaxial shape of the Virgo Cluster dark matter halo adopting algorithm developed by Lee & Kang(2006). In particular, we derive a modified reconstruction algorithm in 2D since 1275 member galaxies's equatorial coordinates are only given. Taking major principal axis of the Virgo Cluster dark matter halo provided by West (2000), we estimate the two axial ratios of the halo and the result is that Virgo Cluster's dark matter halo shape is quite Prolate. We find dark matter halo mass and Gas mass of Virgo with ellipticity, e=0.65, in triaxial shape. Comparing it with case of spherical model, dark matter halo mass and gas mass is lager than 38% and 31%, respectively. By measuring gas mass fraction, f_b, to find dark matter density that is constrained cosmology, We find that the result is inconsistent with a ΛCDM cosmology.