[S7-1] Intrinsic Inclination of Galaxies embedded in Cosmic Sheets and Its Cosmological Implications: An Analytic Calculation

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We investigate analytically a large-scale coherence in the orientation of galaxies embedded in two-dimensional sheet-like structures in the frame of the tidal torque theory. Assuming that the galaxy spin and the surrounding matter fields are intrinsically aligned in accordance with the tidal torque model, we first derive analytically the probability distribution of the galaxy position angles, and evaluate the degree of their inclinations relative to the plane of the sheet. Then, we apply our analytic approach to the nearby spirals in the Local Super Cluster, and provide theoretical explanations about why and to what degree the nearby spirals are inclined relative to the supergalactic plane. Finally, we conclude that the observed large-scale coherence in the orientation of nearby spirals relative to the supergalactic plane can be quantitatively understood in terms of galaxy intrinsic alignment predicted by the tidal torque theory, and that the spins of luminous galaxies might be more strongly aligned with the surrounding matter than the underlying dark halos.

[S7-2] Extreme scattering events by accreting remnant stars

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Extreme scattering events (ESEs) are unusual and dramatic flux variations over several weeks to months in radio waves emitted from astrophysical sources. Free electron lumps are responsible for the variations but the nature of the lumps is a mystery. The proposed models such as turbulent electron lumps and self-gravitating clouds of Jovian mass have drawbacks in their origin. We here propose that the accreting remnants stars of about a solar mass such as old neutron stars, white dwarfs, primordial black holes, and MACHOs could be the sources of the electron lumps in question. The refractive lensing by the remnant stars reproduce the observed ESE pattern successfully. Re-examining the ESE covering factor, the observability of the remnant stars is discussed.