[구GC-21] Non-thermal Radiations from Cosmic Rays in Cosmic Web

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It is believed that a large fraction of the baryons of the universe at the present epoch reside in filaments of cosmic web as the Warm-Hot Intergalactic Medium. Due to low density and temperature, however, those baryons are extremely difficult to be probed. In this paper, we present non-thermal radiations from cosmic rays (CRs) in filaments, which were calculated using simulation data. The primary CR protons and electrons were produced by cosmological shocks in filaments. The secondary CR electrons were produced through proton-proton and proton-photon interactions. The typical spectra and emissivities in different bands due to those CRs are shown. The possibility of detecting non-thermal radiations from filaments is discussed.

[박GC-22] Physical Properties of Tidally Induced Spiral Structure in Interacting Disk Galaxies

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Using numerical N-body simulations, we investigate the physical properties of tidal structure in a disk galaxy created by gravitational interactions with its companion. We consider two different sets of models: controlled models in which an infinitesimally-thin stellar disk with a rigid halo/ bulge is perturbed by a point-mass companion moving on a prescribed parabolic orbit; fully self-consistent models where a three-dimensional disk with a live halo/bulge interacts with an extended perturbing companion. In both sets of models, the initial disks consist only of stars with the Toomre parameter Q~2, and the strength of interaction is parametrized by the mass and the pericenter distance of the companion. We find th paridal interaction produces well-defined spiral bys and extended ridal features such as bridge and tail th paare all transient, but distinct in nature. In an outer disk, strong ridal force produces a tidal bridge by locking epicycle phases of near-streparticles to the companiont in le shaping a tidal tail parameopposite streas strongly-perturbed near- streparticles overtake mildly-perturbed, far- streparticles. In an inner disk, oextemeother hand, a two- byed ar-arith allspiral p pternrbes ae inner diskerkinematic alignesnt of perturbed particle orbits. The pattern speed of the spiral arms varies with both radius and time, indicative of kinematic density waves. The strength of the arm and tail and their formation time are tightly correlated with the strength of tidal interaction. In the fully three-dimensional models, the perturbing galaxy suffers from dynamical friction to lose its orbital angular momentum. We discuss our findings in application to tidal spiral arms in grand-design spiral galaxies as well as the criterion of tail formation in the context of probing dark-mass haloes.