[구GC-11] Gaseous Structures in Barred Galaxies: Effects of the Bar Strength

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We use hydrodynamic simulations to study the physical properties of gaseous structures in barred galaxies and their relationships with the bar strength. We vary the bar mass fbar relative to the spheroidal component as well as its aspect ratio. We derive expressions for the bar strength Qb and the radius where the maximum bar torque occurs. When applied to observations, these expressions suggest that bars in real galaxies are most likely to have fbar = 0.25-0.5. Dust lanes approximately follow one of x1-orbits and tend to be more straight under a stronger and more elongated bar. A nuclear ring of a conventional x2 type forms only when the bar is not so massive or elongated. The radius of an x2-type ring is generally smaller than the inner Lindblad resonance, decreases systematically with increasing Qb, evidencing that the ring position is not determined by the resonance but by the bar strength. Nuclear spirals exist only when the ring is of the x2-type and sufficiently large in size. Unlike the other features, nuclear spirals are transient in that they start out as being tightly-wound and weak, and then due to the nonlinear effect unwind and become stronger until turning into shocks, with an unwinding rate higher for larger Qb.

[구GC-12] ON THE ASSEMBLY HISTORY OF STELLAR COMPONENTS IN MASSIVE GALAXIES

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Matusoka & Kawara (2010) showed that the number density of the most massive galaxies (log $M/M_\odot$=11.5− 12.0) increases faster than that of the next massive group (log $M/M_\odot$=11.0−11.5) during $0 < z < 1$. This appears to be in contradiction to another important empirical concept of “downsizing”. We attempt to understand the two observational findings in the context of the hierarchical merger paradigm using semi-analytic techniques. Our models closely reproduce the result of Matusoka & Kawara (2010). Downsizing can also be understood as larger galaxies have on average smaller assembly ages but larger stellar ages. Our fiducial models further reveal the details on the history of stellar mass growth of massive galaxies. The most massive galaxies (log $M/M_\odot$=11.5−12.0 at z=0), which are mostly brightest cluster galaxies, obtain roughly 70% of their stellar components via merger accretion. The role of merger accretion monotonically declines with galaxy mass: 45% for log $M/M_\odot$=11.0− 11.5 and 20% for log $M/M_\odot$=10.5−11.0 at z = 0. The specific accreted stellar mass rates via galaxy mergers decline very slowly during the whole redshift range, while the specific star formation rates sharply decrease with time. In the case of the most massive galaxies, merger accretion becomes the most important channel for the stellar mass growth at $z \sim 2$. On the other hand, in-situ star formation is always the dominant channel in the L_* galaxies.