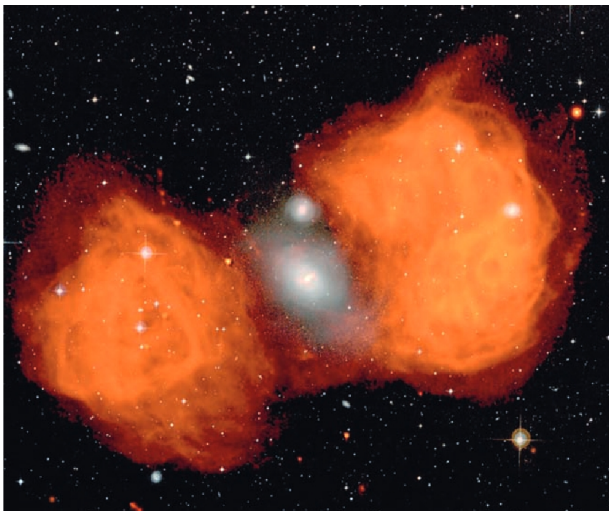
Galaxy Formation and Evolution.



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The research primarily focuses on galaxy formation, the role of dark matter, and the creation of supermassive black hole binaries during galaxy mergers. To investigate these areas, modern computational tools are used, such as N-body simulations on parallel supercomputers. In the future, with anticipated advancements in algorithms and supercomputer technology, there are plans to develop more realistic theoretical models for galaxies and galactic structure. The ultimate goal is to compare these theoretical models with observations from missions like the James Webb Telescope and Gaia.

Galaxy evolution is driven by either gradual or violent processes. The research team studies changes in various properties of galaxies (such as their content in stars, gas, and dust) over cosmic time, as well as changes in stellar kinematics during galaxy collisions. Recently, emphasis has been placed on the modifications to galaxies' gas content and star formation due to feedback mechanisms activated when matter falls onto supermassive black holes at their centers. Numerous studies of both local and distant galaxies using large ground-based facilities have been conducted for this purpose. Observation time has been secured with the James Webb Space Telescope, and its MIRI data will be used to study how a jet of relativistic particles emitted by a black hole leads to the collapse or dissipation of clouds, thereby altering star formation in a nearby galaxy.

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