The environmental effect on star formation in low-mass galaxies

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Abstract
The interaction between low-mass galaxies are of critical importance for the growth and evolution of galaxies. The star formation can be enhanced during interactions between massive galaxies, but very few studies focus on the interaction between low-mass galaxies. In this work, we explored the current star-formation surface density in both isolated and interacting galaxies and look for enhanced star formation during the interactions. A galaxy will be considered as a galaxy pair candidate if the physical separation between it and its closest low-mass galaxies is smaller than 5000 light years, otherwise it will be put into the isolate galaxy sample. This sample intentionally excludes galaxies with a massive galaxy neighbor nearby as massive neighbors can harass low-mass companion galaxies and can cause them to become quenched. This project is the first attempt to systematically study how the internal star-formation activities of low-mass galaxies are influenced by outer environment.

Star-formation Rate Surface Density Calculation

The star-formation activities in the outskirt are not significantly affected by the environment.

Results:

- Star-formation enhancement is observed when two low-mass galaxies are interacting with each other.
  - In general, most of the low-SFR galaxies are isolated.
  - The negative slopes in “Inner” region and “Middle” region indicate that the SFR surface density drops as the projected separation increases, which suggests that the interaction between low-mass galaxies have the ability to affect the star-formation activity in the involved galaxies.
  - SFR in the Inner region of a low-mass galaxy is more significantly enhanced when the target galaxy is interacting with another low-mass galaxy.
  - The star-formation activities in the outskirt are not significantly affected by the environment.

- Both isolated and paired low-mass galaxies have stronger star-formation activity in their central region.