

Do Galaxy Morphologies Really Affect the Efficiency of Star Formation During the Phase of Galaxy Transition?

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Morphological quenching : Stellar bulgeがあると星形成効率が抑制される

- Spheroidの中のガス円盤は星形成しにくくなる？(Martig+09)
- ATLAS 3D : 早期型では晩期型銀河に比べてSFEが半分 (Davis+14, etc)
- ←でも、サンプル選出に問題あり

⇒ green valley(GV)銀河(MSから0.5~1.5dex下がった銀河)でmorphological quenchinが効いているのか？

GVを二つに分けてCOで観測

- Disk+green
- Bulge+green

サンプル選出

- SDSS DR7 + SFR from MPA/JHU
- $0.025 < z < 0.05$
- $\text{Log } M^* (\text{Msun}) = 10.8 - 11.2$
- $\text{Log sSFR} (\text{yr}) = -11 \sim -10.5$
- AGNなし
- C-indexでバルジ化ディスク化を区別

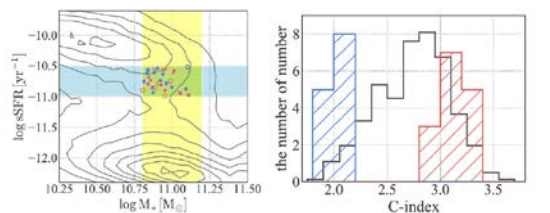


Figure 1. (Left) Stellar mass vs. specific SFRs diagram for all SDSS galaxies (grey contours), while the blue and red symbols show the selected disk- and bulge-dominated galaxies. (Right) Histogram of the number of galaxies versus C-index for disk+green (blue) and bulge+green (red) galaxies.

28天体を野辺山で観測

- 13 disk dominated (DD) → 全天体検出
- 15 bulge domated (BD) → 8天体検出
- xCOLDGASS銀河から1 DD, 6 BD

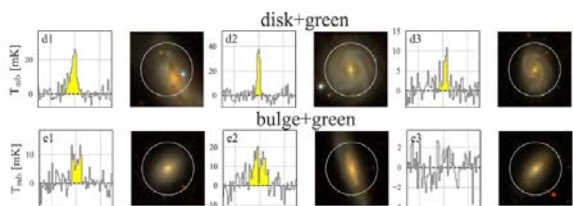


Figure 2. CO spectra obtained by our NRO 45 m observations and the SDSS cutout three-color images (g, r, i) for the disk+green (top panels) and bulge+green (bottom panels) galaxies.

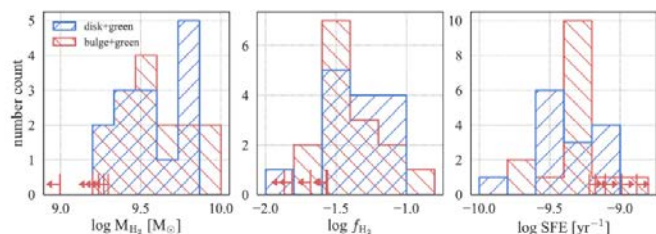


Figure 5. Distributions of M_{H_2} (left), f_{H_2} (middle), and SFE (right) for the disk+green (blue) and bulge+green (red) galaxies. The color-coding is the same as in Figure 4. The red arrows show the upper and lower limits for the CO-undetected bulge+green galaxies, which are not included in the histograms.

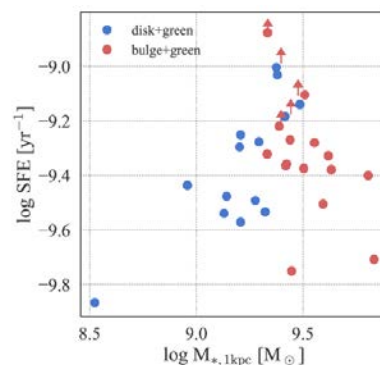


Figure 8. SFE as a function of $M_{*,1\text{kpc}}$. The disk+green and bulge+green galaxies, defined according to the C-index in this work, are shown by blue and red symbols.

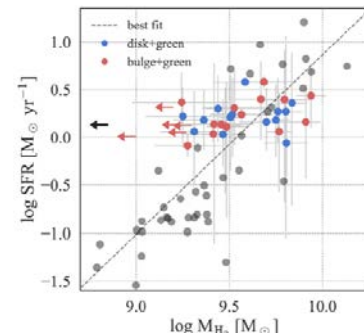


Figure 9. (Left) Relation between M_{H_2} and SFR for disk+green (blue circles) and bulge+green (red symbols) galaxies. A dashed line indicates the best fit.

Fig8 : SFEのmorphology依存性はなさそう

Fig9 : KS-則の違いはなさそう

未検出天体で f_{H_2} を検出限界の一桁下の値にしても結果は変わらず

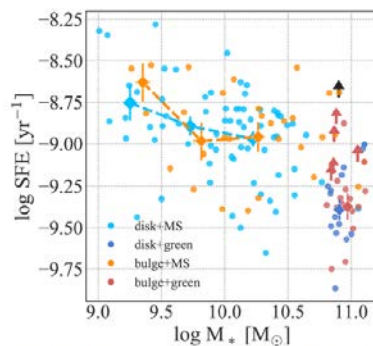


Figure 10. Distribution of galaxies in the M_* - SFE plane for the disk+green (blue) and bulge+green (red) galaxies. The color-coding is the same as in Figure 4.

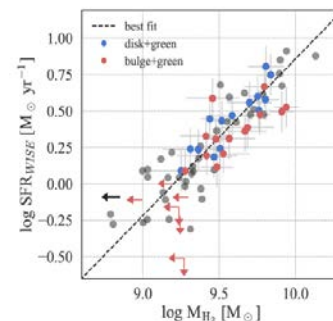


Figure 11. (Left) Comparison between the SFRs from the MPA/JHU catalog and the SFRs from the MPA/JHU catalog. A dashed line indicates the best fit.

Fig10 : MSからGreen ValleyへSFEが落ちる。

Fig11 : SFR_WISEを使った結果。未検出天体のオフセットが消える。

が、スタックした結果はまだオフセットしているので、なにか違いがあるのか？

→ 星形成とより密接に関係しているdense gasを(HCNとか)で観測すれば違いが判るかもしれない。