arXiv:2105.09956

Are all post-starbursts mergers? *HST* reveals hidden disturbances in the majority of PSBs.

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Gas-Rich, Shocked PSB 26天体をHST B,I,H + SDSS i撮像

Bimodality of nearby galaxies

- color-magnitude distribution
- Structure : 青い銀河はディスク、赤い銀河はバルジ

これらの間の遷移はどのように起こる? => post starburst galaxies

- K+A / E+A galaxy : massive star + Hdelta 吸収。ただAGNコンタミに弱い
- Shocked Post-starburst Galaxies : SPOGs : E+Aより若い種族
  - Lick Hdelta index > 5A
  - BPT diagram でショック領域にいる & 星形成領域、compositeではない (Fig 1)
- HST Snapshot survey で観測した26天体 (HST-SPOCs)
- Control sample
  - 186 quiescent / 220 starforming galaxies
  - Distributed galaxiesは除去 => 138 QG/157 SFG

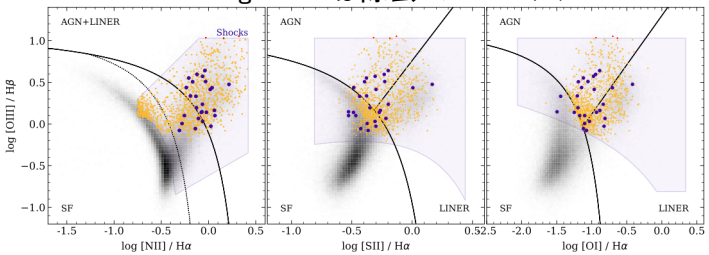

Figure 1. The line diagnostic diagrams (Baldwin et al. 1981; Veilleux & Osterbrock 1987) used to determine the ionization mechanism with spectroscopic data for [O III]/Hβ, [N II]/Hα, [S II]/Hα (using the [S II] doublet) and [O I]/Hα emission lines. Three data sets are plotted: ELG sample (**grey**), SPOGs (**orange**), and HST-SPOGs (**purple**). Regions of star formation (SF), AGN, and LINER emission are separated by black solid lines (Kauffmann et al. 2003b; Kewley et al. 2006). The purple outline shows the shock ionization boundaries from Alatalo et al. (2016a). 3 galaxies shown in red are SPOGs that have ionization above the shock boundary and are therefore excluded from our sample.

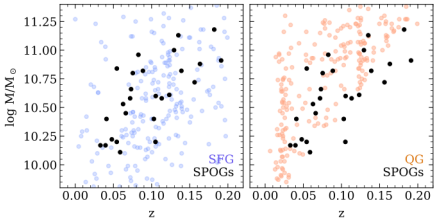

Figure 4. Mass and redshift distribution of the candidate comparison galaxies and HST-SPOGs (black). **Left:** candidate star-forming galaxies (blue), **Right:** candidate quiescent galaxies (orange).

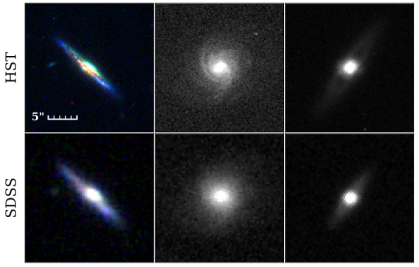

Figure 7. Thumbnails of an example HST-SPOG J102826+573609 (left), its matched star-forming (center) and quiescent (right) galaxies using *HST* (top) and SDSS (bottom) imaging. All images are

形態分類

- Non-parametric : STATMORPH
  - Sersic n, radius, concentration asymmetry, Gini, M20, ….
- Galfit
  - Sersic index
  - Bulge-disk decomposition
  - Residual Flux fraction (RFF)
- Color gradient

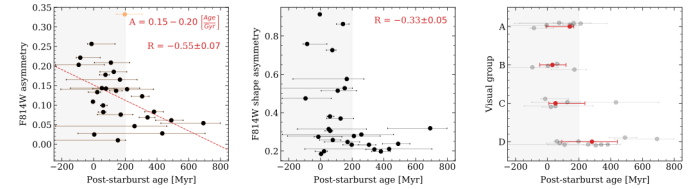

Figure 14. Left: the correlation between *I*-band asymmetry and post-starburst age. Negative ages indicate a burst is ongoing. Red dashed

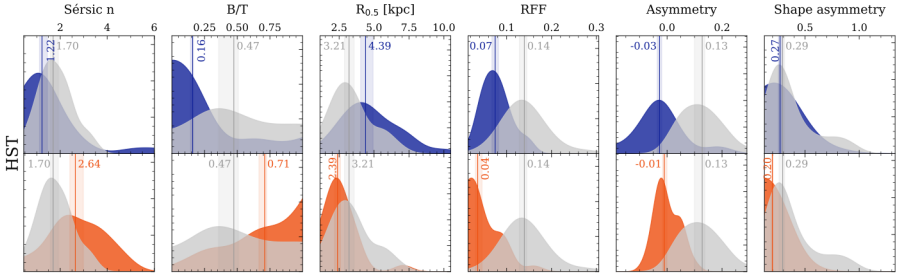

Figure 15. Distributions of morphological parameters for 3 samples: HST-SPOGs (grey), star-forming galaxies (blue), and quiescent galaxies (orange). Left to right, the parameters are: Sérsic index, B/T, asymmetry, RFF, and Sérsic $R_{0.5}$. Parameters were computed using *HST*

- 形態
  - SFGとQGの間くらい
  - Sersic nはSFGに近い:遠方とは違う? PFSコンポーネントを除いているおかげ?
  - B/TはQG
- Disturbance
  - 88%になんらかのdisturbance
  - 過去の研究(30-50%)よりも高い : 空間分解能が足りなかった?
    SPOGはより若いものを見ているせい?
    => PSB年齢が若いほど asymmetric =>時間とともに消えていく?
  - つよいasymmetryは65%なので、残り3割はinteral featureなのでは
    - RFF は青い方が大きい:massive starの寄与?ダスト?いずれにせよgravitational perturbation のせいではない?
- Color gradient : バルジは赤くてディスクは青い
  - 過去の研究ではPSBでは逆になることが多い
  - 今回バルジが赤いのはダスト吸収のせいでは?