Optical integral field spectroscopy of intermediate redshift infrared bright galaxies

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ABSTRACT

The extreme infrared (IR) luminosity of local luminous and ultra-luminous IR galaxies (U/LIRGs; $11 < \log L_{IR}/L_{\odot} < 12$ and $\log L_{IR}/L_{\odot} > 12$, respectively) is mainly powered by star-formation processes triggered by mergers or interactions. While U/LIRGs are rare locally, at $z > 1$, they become more common, they dominate the star-formation rate (SFR) density, and a fraction of them are found to be normal disk galaxies. Therefore, there must be an evolution of the mechanism triggering these intense starbursts with redshift. To investigate this evolution, we present new optical SWIFT integral field spectroscopic Hα+[N II] observations of a sample of 9 intermediate-z ($0.2 < z < 0.4$) U/LIRG systems selected from *Herschel* 250μm observations. The main results are the following: (a) the ratios between the velocity dispersion and the rotation curve amplitude indicate that 10–25% (1–2 out of 8) might be compatible with being isolated disks while the remaining objects are interacting/merging systems; (b) the ratio between un-obscured and obscured SFR traced by Hα and L_{IR}, respectively, is similar in both local and these intermediate-z U/LIRGs; and (c) the ratio between 250μm and the total IR luminosities of these intermediate-z U/LIRGs is higher than that of local U/LIRGs with the same L_{IR}. This indicates a reduced dust temperature in these intermediate-z U/LIRGs. This, together with their already measured enhanced molecular gas content, suggests that the interstellar medium conditions are different in our sample of intermediate-z galaxies when compared to local U/LIRGs.

- local U/LIRGとz>1 U/LIRGは違う
  - merging/interactionとisolatedの割合
  - 星形成領域の広がり
  - SED, ダスト温度、金属量…

⇒intermediate-z U/LIRGの研究

- Oliver+2012のHerMESカタログから
  1. S250 > 150 mJy
  2. 0.2 < z < 0.8

  ⇒21サンプル

  ⇒そのうち北半球の9個をSWIFT –IFSでfollow up

  0.63-1.04um, R=3200-4400, FoV = 10”.3 × 20”.9, seeing=1”.6
- Ha656.3nm, [NII] 654.8nm, [NII] 568.3nm
- GalPaK^{3D}(Bouche+2015)で回転ディスクモデルをフィット

  ⇒力学パラメータ

Fig 1

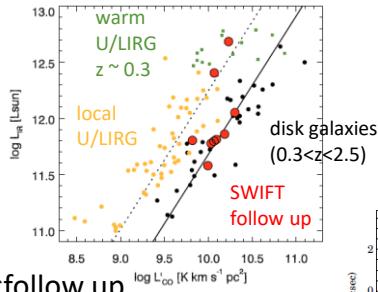


Fig 2

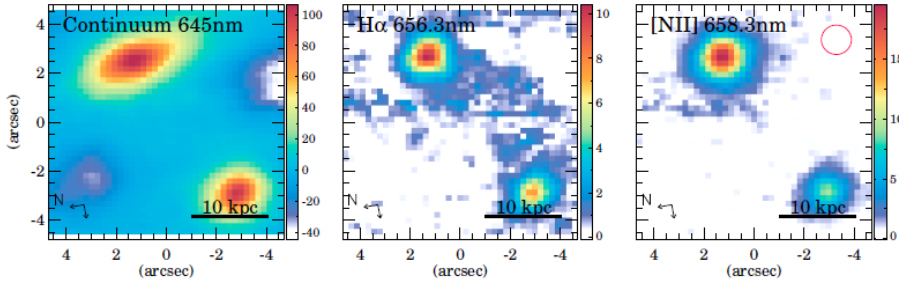
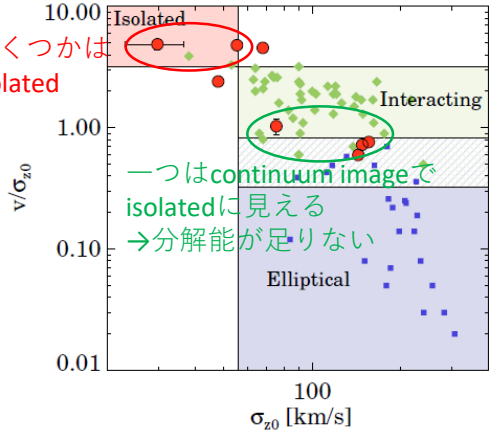


Fig 6



いくつかはisolated

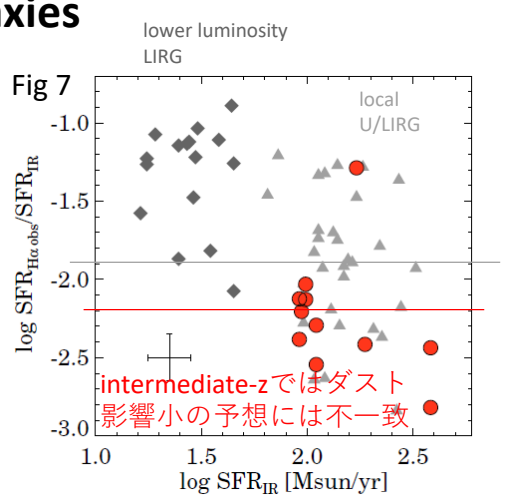
一つはcontinuum imageでisolatedに見える

→分解能が足りない

σは赤方偏移とともにgas fractionによって増加するので補正 → σ_{z0} (Wisnioski+2015)

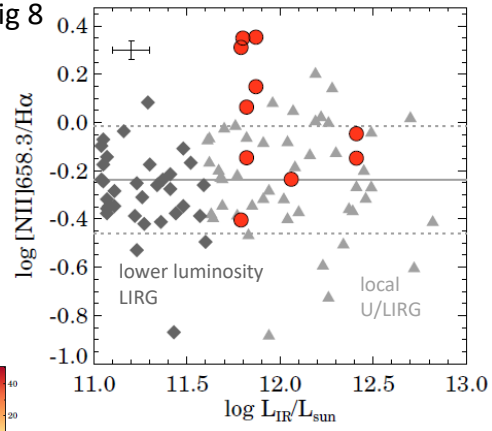
$$\sigma_{z_0}/\sigma_{z_{U/LIRG}} = f_{gas}(z=0)/f_{gas}(z=z_{U/LIRG})$$

Fig 7



intermediate-zではダスト影響小の予想には不一致

Fig 8



N2 indexがやや高いように見えるけど、優位ではなさそう

Fig 5

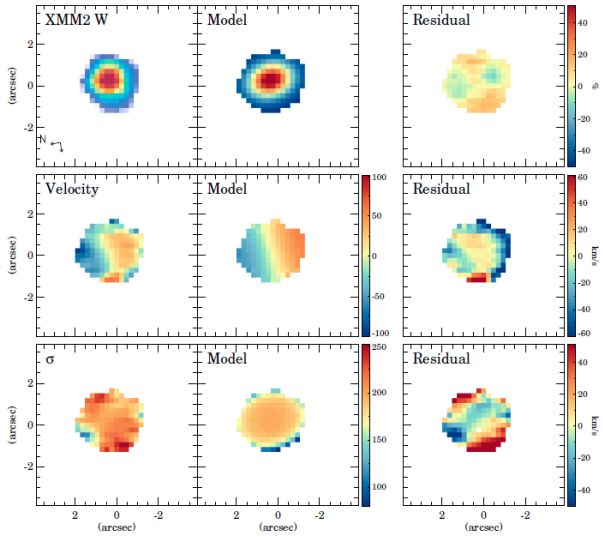
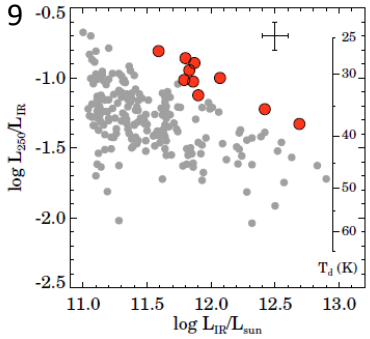


Fig 9



今回の250umセレクションではダスト温度の低いものが選択される