Spatially Resolved Properties of Galaxies from CANDLES+MUSE: Radial Extinction Profile and Insights on Quenching

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ABSTRACT

Studying the internal processes of individual galaxies at kilo-parsec scales is crucial in enhancing our understanding of galaxy formation and evolution processes. In this work, we investigate the distribution of star formation rate (SFR), specific SFR (sSFR), and dust attenuation across individual galaxies for a sample of 32 galaxies selected from the MUSE-Wide Survey at $0.1 < z < 0.42$ with a dynamic range in stellar masses between $10^{7.7}$ and $10^{10.3}$ $M_{\odot}$. We take advantage of the high spatial resolution of the MUSE integral-field spectrograph and measure reliable spatially resolved Hα and Hβ emission line maps for individual galaxies. We also derive resolved stellar mass, SFR and dust maps using pixel-by-pixel SED fitting on high resolution multi-band *HST*/ACS and *HST*/WFC3 data from the CANDELS survey. By combining these, we analyze the radial profile of various physical parameters across these galaxies. We observe a radial dependence in both stellar and nebular color excess profiles peaking at the inner regions of galaxies. We also find the color excess profiles to most strongly correlate with the integrated sSFRs of galaxies. The median $sSFR_{H\alpha}$ radial profiles of galaxies in our sample show a 0.8 dex increase from the central regions outward. This increase compared to the almost flat median radial profile of $sSFR_{SED}$, which traces longer timescales of star formation, is in favor of the inside-out quenching of star formation. We bring further evidence for this quenching scenario from the locus of different subregions of galaxies on the SFR-M_* and sSFR-M_* relations.

- 銀河を空間分解することでより物理の詳細に迫りたい
- 特にSED-fittingは多くの仮定のもとに成り立っており不定性が大きい
- Hα、Hβ輝線の情報も使ってより正確に見ていく

サンプル
- CANDLESとMUSEのデータからS/Nの大きい32の銀河を抽出
- 0.1<z<0.42
- 10^7.7 – 10^10.3 M_solar

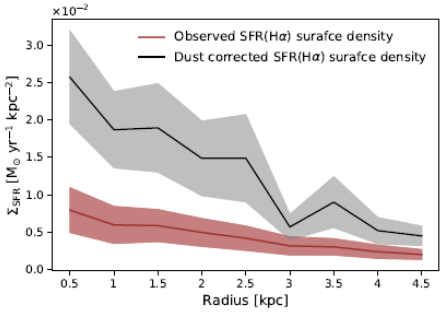

Figure 4. Median radial profile of Σ_{SFR} for all the galaxies in the sample. Red and black profiles represent the $SFR_{H\alpha}$, and the dust-corrected $SFR_{H\alpha}$, respectively. Shaded regions correspond to 1σ error in the data.

- ダスト補正をすると傾きが
  - ダストは中心領域で多く、外側に向かって減少

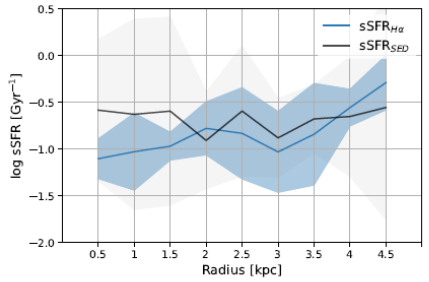

Figure 5. Median radial sSFR profiles for galaxies in the sample. Solid black profile presents the SED-derived sSFR and the solid blue profile shows the sSFRs calculated by dividing the dust-corrected $SFR_{H\alpha}$ by the SED-derived stellar mass in each annulus. In both profiles, shaded regions represent 1σ error in the data.

- SEDではflat
- Hαでは傾き？
  - 中心領域では早期にできた星々
  - 外側に比べてgas-rich
  - Inside-out growthを暗示

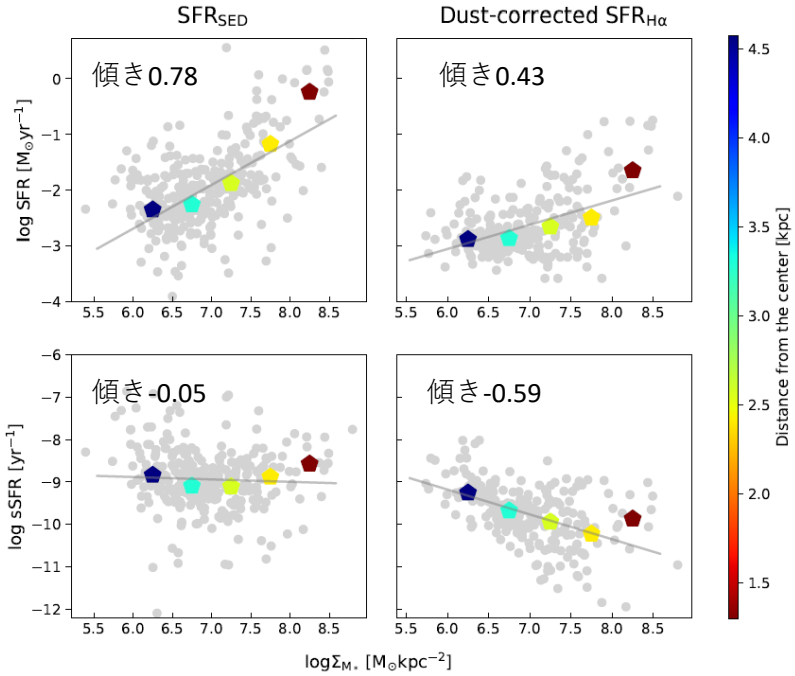

Figure 7. Resolved main sequence and resolved sSFR-M_* relations for galaxies in our sample. Gray data points represent individual annuli in galaxies. Two top panels are presenting resolved main sequence with two different SFR diagnostics. Left panel is based on SFR_{SED} and right panel is based on dust-corrected $SFR_{H\alpha}$. Bottom panels present sSFR-M_* relation with $sSFR_{SED}$ on the left and dust-corrected $sSFR_{H\alpha}$ on the right. Solid gray lines are the best linear fits to grey data points with the fitted parameters presented in Table 1. Colored pentagons are the median SFR/sSFR (top/bottom panels) in bins of stellar mass which are color-coded by the average distance from the center of the galaxies.