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FIRST RESULTS FROM THE VIRIAL SURVEY: THE STELLAR CONTENT OF *UVJ*-SELECTED QUIESCENT GALAXIES AT $1.5 < z < 2$ FROM KMOS[†]

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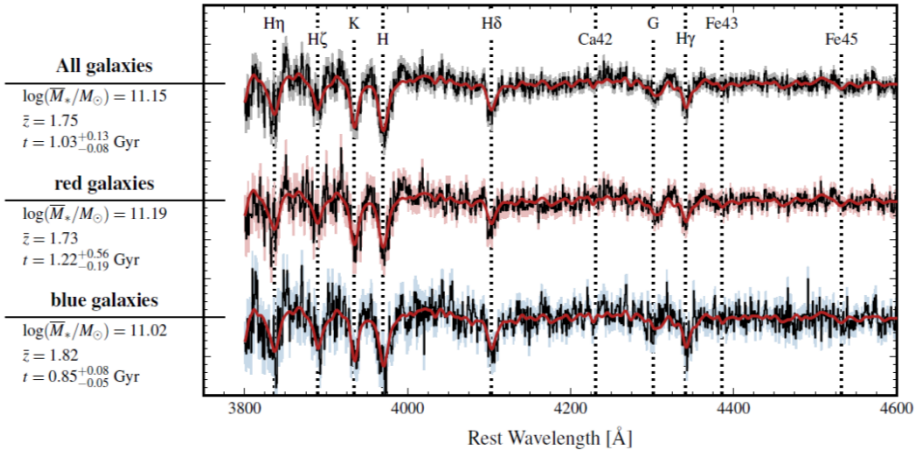
ABSTRACT

We investigate the stellar populations of 25 massive, galaxies ($\log[M_*/M_\odot] \geq 10.9$) at $1.5 < z < 2$ using data obtained with the *K*-band Multi-Object Spectrograph (KMOS) on the ESO VLT. Targets were selected to be quiescent based on their broadband colors and redshifts using data from the 3D-HST grism survey. The mean redshift of our sample is $\bar{z} = 1.75$, where KMOS *YJ*-band data probe age- and metallicity-sensitive absorption features in the rest-frame optical, including the *G* band, Fe I, and high-order Balmer lines. Fitting simple stellar population models to a stack of our KMOS spectra, we derive a mean age of $1.03^{+0.13}_{-0.08}$ Gyr. We confirm previous results suggesting a correlation between color and age for quiescent galaxies, finding mean ages of $1.22^{+0.56}_{-0.19}$ Gyr and $0.85^{+0.08}_{-0.05}$ Gyr for the reddest and bluest galaxies in our sample. Combining our KMOS measurements with those obtained from previous studies at $0.2 < z < 2$ we find evidence for a 2–3 Gyr spread in the formation epoch of massive galaxies. At $z < 1$ the measured stellar ages are consistent with passive evolution, while at $1 < z \lesssim 2$ they appear to saturate at ~1 Gyr, which likely reflects changing demographics of the (mean) progenitor population. By comparing to star-formation histories inferred for "normal" star-forming galaxies, we show that the timescales required to form massive galaxies at $z \gtrsim 1.5$ are consistent with the enhanced α-element abundances found in massive local early-type galaxies.

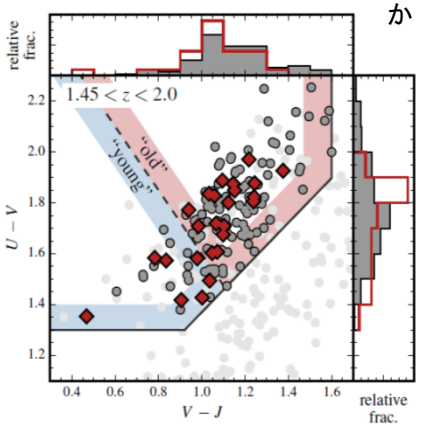
Subject headings: galaxies: evolution — galaxies: formation — galaxies: high-redshift



初期宇宙での銀河形成のシナリオ
cold accretionによるガスの集積
↓
main sequence銀河の形成
↓
星形成がquenchしてquiescent galaxyになる。そのあとmergerで太る

・z~2ですでにred sequenceができているがその起源はよくわかっていない。

KMOS VIRIAL(VLT IR IFU Abs. Line GTO Survey)
- R~3500
- 3D-HSTカタログから選択
  - 1.45<z<2
  - UVJ選出
  - Younger(~0.9Gyr)/older(~1.6Gyr)にわける（Whitaker+13）
  - F1040W<22.5 : 10^10.9 Msol
  - 132天体
- 最初の2セメスターの初期結果



- 解析はSPARKパッケージ
  - 大気吸収の補正はモデル大気(MOLECFIT)＋標準星から推定したPWV
- SSPテンプレートとのcross-correlationでzを決める
  - 25天体で決定できた
- 3種類のスタッキング=>SSPモデルフィット
  - ~1Gyr
  - Solar metallicity

・z<1ではpassive evolutionとconsistent
・z>1では比較的若い<=直近にできてきている
・z=2->1でquiescent galaxyの数密度は3倍になっている(Tomczak+14)こととconsistentか

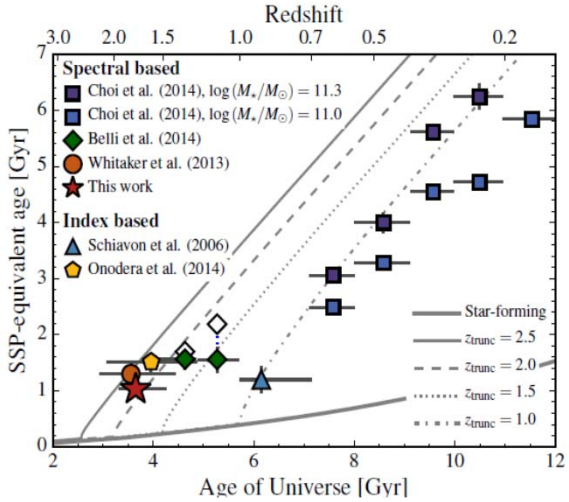


図4のモデルの、星形成の時間進化の様子
：z=8からzttruncまで星形成
Z>1.5で観測されているquiescent galaxyあれば(ztrunc=2.5くらいなので)local ETGのprogenitorと言えそう