# Обзор ArXiv: astro-ph,
# 25-28 февраля 2019 года

От Сильченко О.К.

# ArXiv: 1902.09564

Extremely Low Molecular Gas Content in a Compact, Quiescent Galaxy at $z = 1.522$

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## ABSTRACT

One of the greatest challenges to theoretical models of massive galaxy formation is the regulation of star formation at early times. The relative roles of molecular gas expulsion, depletion, and stabilization are uncertain as direct observational constraints of the gas reservoirs in quenched or quenching galaxies at high redshift are scant. We present ALMA observations of CO(2–1) in a massive ($\log M_\star/\mathrm{M}_\odot = 11.2$), recently quenched galaxy at $z = 1.522$. The optical spectrum of this object shows strong Balmer absorption lines, which implies that star formation ceased $\sim$0.8 Gyr ago. We do not detect CO(2–1) line emission, placing an upper limit on the molecular $H_2$ gas mass of $1.1\times10^{10}\,\mathrm{M}_\odot$. The implied gas fraction is $f_{\mathrm{H}_2} \equiv M_{H_2}/M_\star < 7\%$, $\sim 10\times$ lower than typical star forming galaxies at similar stellar masses at this redshift, among the lowest gas fractions at this specific star formation rate at any epoch, and the most stringent constraint on the gas contents of a $z > 1$ passive galaxy to date.

# Наблюдения конкретной галактики на z=1.5

## Оптический спектр

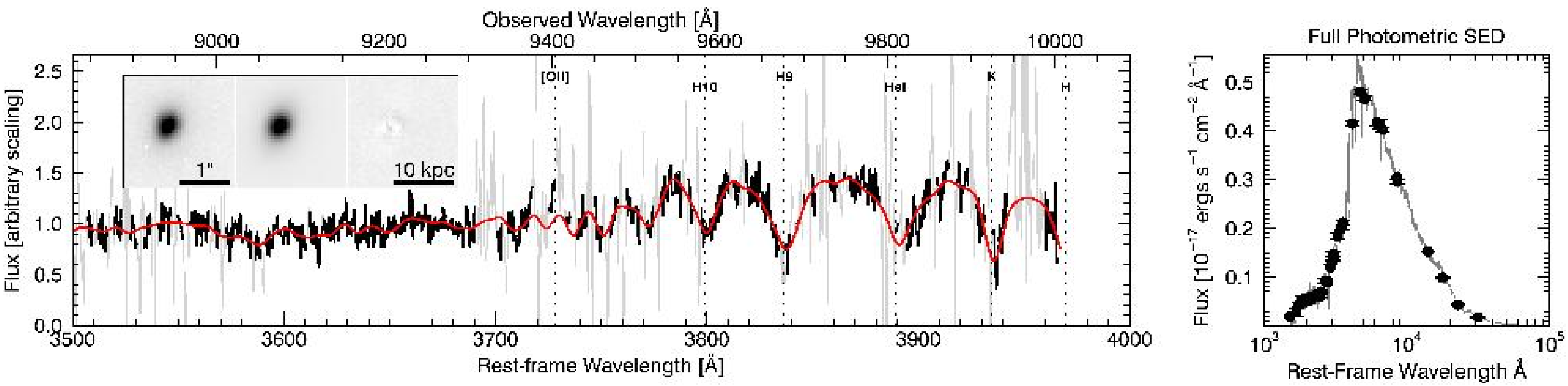
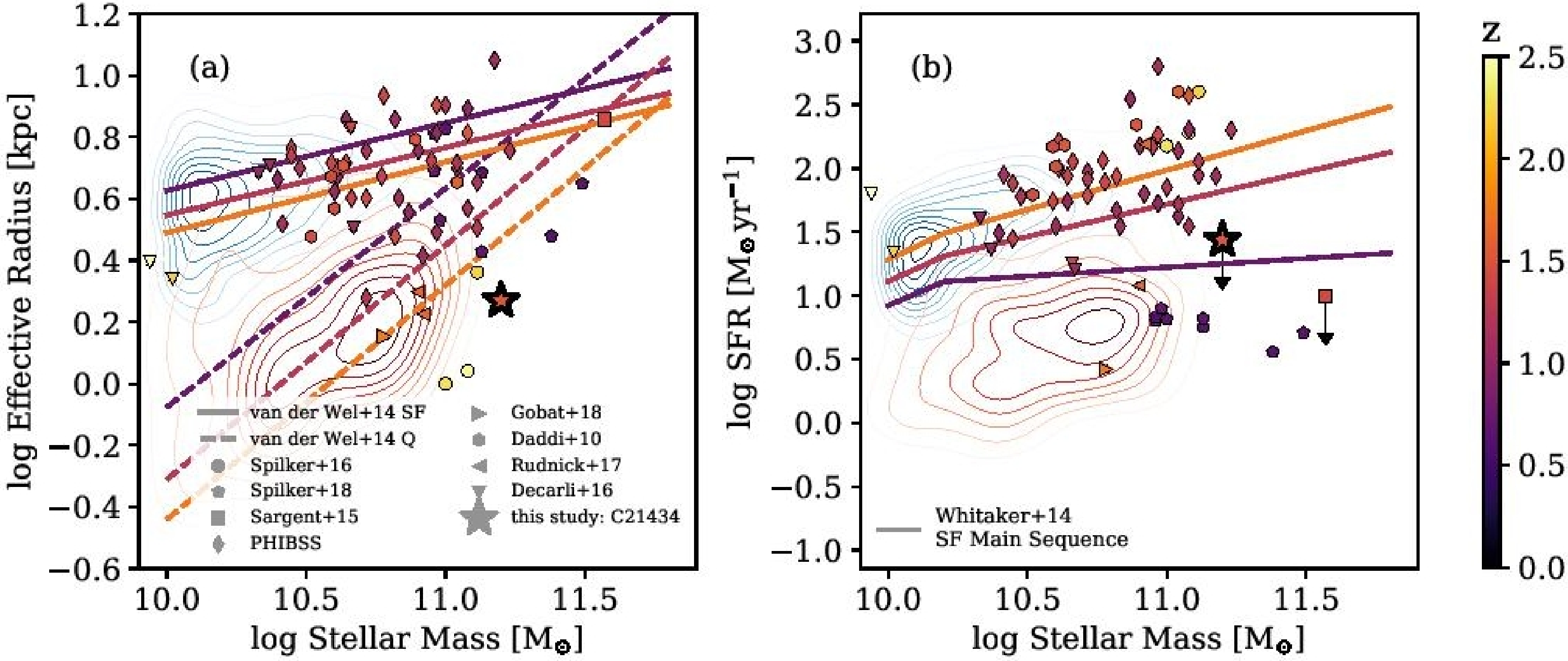



**Figure 1.** Left Panel: Keck/LRIS optical spectrum (black) and best-fitting model (red) and inset HST-WFC3 F160W image, Sérsic model, and residual. Right panel: Photometric spectral energy distribution (SED) for C21434 from the NMBS photometry. The strong Balmer absorption features and peaked SED reflect the young, quiescent stellar population of this galaxy.

## А в CO (ALMA) сигнала нет!

# Массивная компактная галактика БЕЗ звездообразования



# Чем компактнее галактика, тем эффективнее SF?