

SHARDS spectro-photometric decoupling

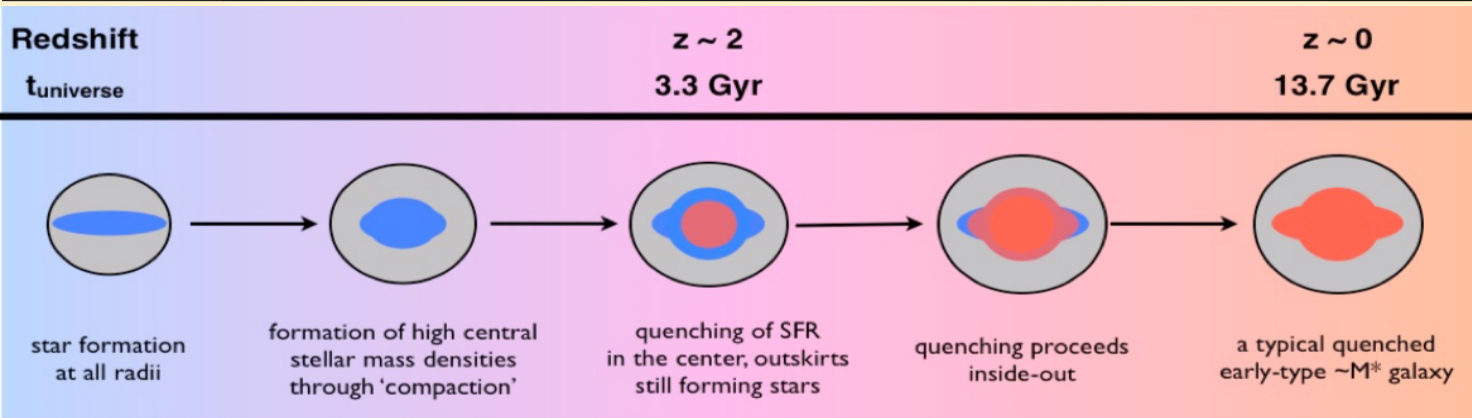
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Studying the integrated properties of galaxies has been so far essential to derive their properties in the local and far Universe. But, being galaxies complex systems, separately unveiling the history of the stellar mass assembly of individual components will provide unprecedented insights on galaxies evolution.

Using a novel technique of multi-wavelength decomposition, we decoupled the spectro-photometric information of the bulge and disk in galaxy, combining the extraordinary spatial information from Hubble Space Telescope (HST) data with the ultra-deep optical medium-band spectrophotometry provided by the Survey for High-z Absorption Red and Dead Sources (SHARDS) images.



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Are bulges formed at early times before the disk component?

(Graham 2013, de La Rosa et al. 2016, Costantin et al. 2020)

From an observational point of view it remains elusive how each individual component assembles and evolves within each galaxy through time

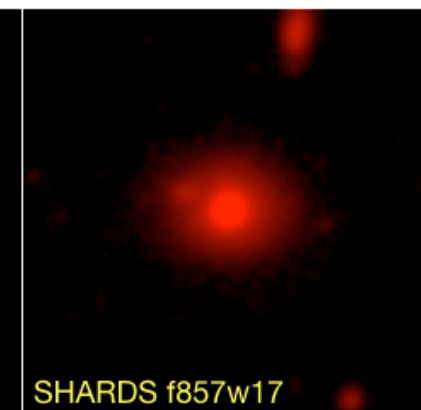
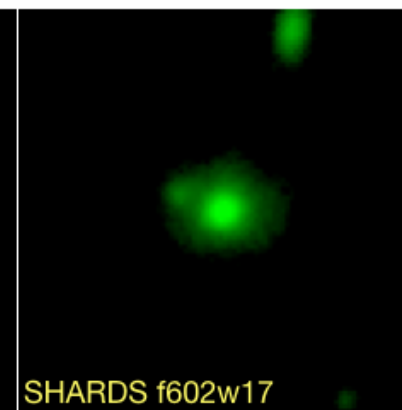
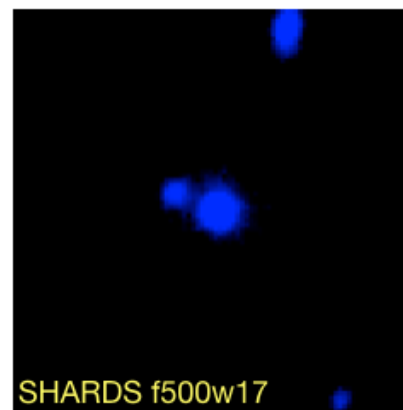
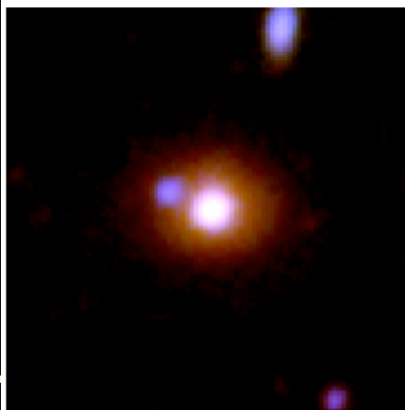
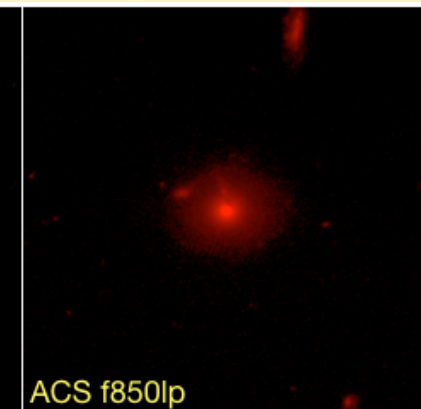
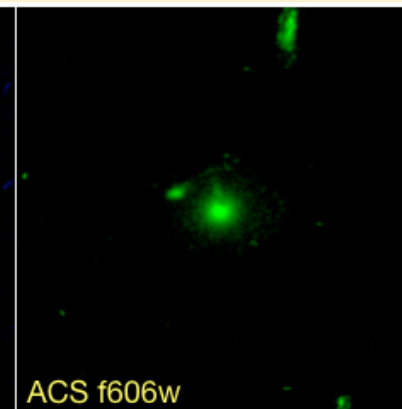
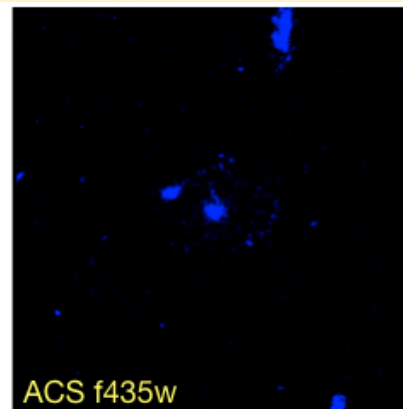
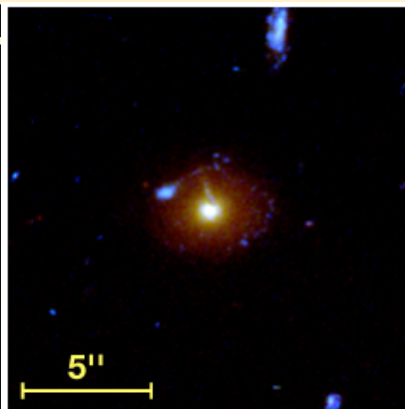
Do bulges arise from disk material?

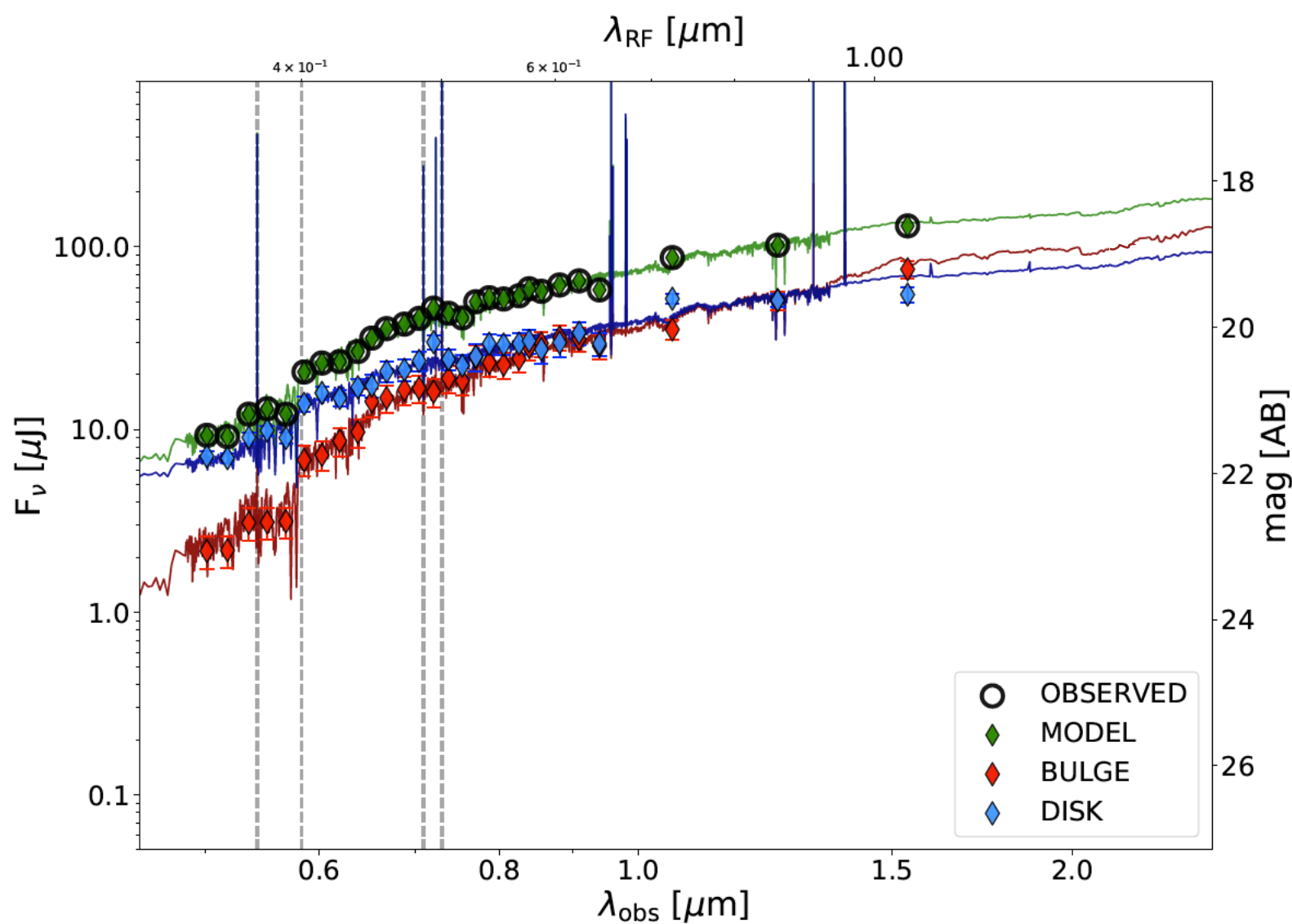
(Kormendy & Kennicutt 2004, Fisher & Drory 2008, Kormendy 2016)

We analyzed a sample of galaxies (>100) in GOODS-N @ $z < 1$ and with $\log(M/M_{\odot}) > 10$

We combined the ultra-deep optical medium-band spectrophotometry provided by SHARDS ($m < 26.5$ AB mag @ 3σ level) with the spatial information from HST

Using this wide wavelength range, it is possible to appreciate the morphological evolution of the bulge and disk component





We derive the SED separately for the bulge and disk of each galaxy

Thanks to its 25 medium-band filters, SHARDS data set permits to accurately determine the main properties of the stellar populations of galaxies, providing a smooth SED with a resolution $R \sim 50$

*We are able to provide robust estimations of some **key properties of the bulge and disk component in individual galaxies**, such as the stellar mass, mass-weighted age, and dust attenuation, discussing the implications for their **assembly history across cosmic time** up to $z = 1$*

The characterization of the bulge and disk hierarchical assembly through redshift could provide bounding constraints for cosmological simulations which aim to reproduce the observed Universe