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H-Band dropouts in the deepest CANDELS field. A new population of bright massive galaxies at $z > 3$

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Abstract

The recent increase in depth, spatial and wavelength coverage of extragalactic surveys has improved dramatically our understanding of galaxy formation and evolution and is revealing a new population of galaxies at high redshift. That is consistent with a downsizing (Cowie, L. L., Songaila, A., Hu, E. M., & Cohen, J. G. 1996, AJ, 112, 839; Heavens, A., Panter, B., Jiménez, R., & Dunlop, J. 2004, Nature, 428, 625; Juneau, S., et al. 2005, ApJ, 619, L135; Bauer, A. E., Drory, N., Hill, G. J., & Feulner, G. 2005, ApJ, 621, L89; Pérez-González et al. 2008, ApJ , 675, 234) scenario, which implies that the most massive galaxies formed early in the history of the universe and evolved quickly. Red color criteria and the analysis of deep mid-IR, has been proven to very useful to identify high-z extremely red galaxies as shown in (Caputi, K. et al. 2012, ApJ, 750, L20 and Huang, J.-S., Zheng, X. Z., Rigopoulou, D. et al., 2011, ApJ, 742, L13). We present our analysis of the deepest near-infrared (F160W/H-band from CANDELS) and mid-infrared (IRAC from GOODS) data taken by HST and Spitzer (in the GOODS fields) to select sources only detected by IRAC and with no CANDELS counterpart (i.e., H $>$ 27, [3.6] $\leq$ 25). These H-Band dropouts constitute a previously unknown population of dust-enshrouded and/or quiescent massive red galaxies at $z > 3$. Using the wealth of data available in the GOODS field, especially the SHARDS data, we characterize the properties of this population of red galaxies and discuss on its relevance for previous estimations of the stellar mass function at $z = 3 - 5$, and the evolution of massive galaxies in the early Universe.