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PRIMUS: GALAXY ENVIRONMENT ON THE QUIESCENT FRACTION EVOLUTION AT $Z < 0.8$

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ABSTRACT

We investigate the effects of galaxy environment on the evolution of the quiescent fraction ($f_{\rm Q}$) from $z = 0.8$ to 0.0 using spectroscopic redshifts and multi-wavelength imaging data from the PRIsm MUlti-object Survey (PRIMUS) and the Sloan Digitial Sky Survey (SDSS). Our stellar mass limited galaxy sample consists of $\sim 14,000$ PRIMUS galaxies within $z = 0.2-0.8$ and $\sim 64,000$ SDSS galaxies within $z = 0.05 - 0.12$. We classify the galaxies as quiescent or star-forming based on an evolving specific star formation cut, and as low or high density environments based on fixed cylindrical aperture environment measurements on a volume-limited environment defining population. For quiescent and star-forming galaxies in low or high density environments, we examine the evolution of their stellar mass function (SMF). Then using the SMFs we compute $f_{\rm Q}(\mathcal{M}_*)$ and quantify its evolution within our redshift range. We find that the quiescent fraction is higher at higher masses and in denser environments. The quiescent fraction rises with cosmic time for all masses and environments. At a fiducial mass of $10^{10.5}M_{\odot}$, from $z \sim 0.7$ to 0.1, the quiescent fraction rises by 15% at the lowest environments and by 25% at the highest environments we measure. These results suggest that for a minority of galaxies their cessation of star formation is due to external influences on them. However, in the recent Universe a substantial fraction of the galaxies that cease forming stars do so due to internal processes.

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