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論文要旨集

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Lyman α Emitters Explored by the HETDEX Blind Spectroscopic Survey

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We investigate galaxy formation and evolution with Lyα emitters (LAEs) at $z = 2-3.5$ obtained by the Hobby Eberly Telescope Dark Energy eXperiment (HETDEX) survey. The HETDEX is a blind spectroscopic survey with a spectral range of $3500-5500$ Å that covers Lyα emission lines at $z = 2 - 3.5$. We obtain 1874 spectroscopically identified LAEs on the sky of 1.91 deg^2. Among the 1874 LAEs, there are 445 type 1 AGNs that have broad Lyα emission lines with FWHM> 1000 km s^{-1}. With our LAE sample, we derive the Lyα luminosity function (LF) in the Lyα luminosity (L_{Lya}) range of $10^{43.0-45.2}$ erg s^{-1} with great accuracy. At the bright end of $L_{\mathrm{Lya}} > 10^{43.5}$ erg s^{-1}, our Lyα LF has a significant hump, spectroscopically confirming the claims given by previous photometric surveys. Exploiting our spectra, we find that this bright-end hump is composed of type 1 AGNs. We show that our Lyα LF can be fitted with the linear combination of the Shechter function and the power law. From the Schechter component of our Lyα LF, we measure the faint-end slope of Lyα LF to be $\alpha = -1.85^{+0.16}_{-0.10}$. Combining with previous results at other redshifts, we find a possible redshift evolution of α at $z \sim 2 - 6$ such that α steepens towards high redshift. The correlation coefficient between α and z is -0.64 that corresponds to the confidence level of 82%. This is the first time that the redshift evolution of α is identified at a reasonable confidence level. We also derive the UV continuum LF (UV LF) of type 1 AGNs in our LAE sample, reaching the very faint absolute UV continuum magnitude (M_{uv}) of ~ -18. The number densities of our bright UV continuum ($M_{\mathrm{UV}} < -21$) type 1 AGNs agree well with those from previous studies at the similar redshift. On the other hand, our faint AGNs with $-21 < M_{\mathrm{UV}} < -18$ have number densities smaller than those previously reported. We argue that our type 1 AGN UV LF is reliable due to the low uncertainty in our completeness correction. Comparing with the type 1 AGN UV LF at $z \sim 0$, we find that the number densities of faint UV continuum ($M_{\mathrm{UV}} > -21$) type 1 AGNs increases from $z \sim 2$ to $z \sim 0$. This represents the direct identification of the downsizing of faint UV continuum AGNs at $-20 < M_{\mathrm{UV}} < -18$.