

X22a **Visible and Hidden Star Formation and Dust Extinction in the Universe at** $0 < z < 1$ 

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We are investigating the evolution of the star formation (SF) of galaxies with far-infrared (FIR) and far-ultraviolet (FUV) luminosity functions (LFs) using the data of *IRAS/Spitzer* and *GALEX*. We have already shown that about 60% of the SF is hidden by dust at  $z = 0$ , while the fraction reaches 85% at  $z = 1$  (Takeuchi et al. 2005). In order to explore what kind of galaxies contribute to this dramatic evolution of the dust extinction, we first performed a FIR-FUV bivariate statistical analysis of the Local galaxies. Since we have good indicator observables of both direct (i.e. UV) and hidden (i.e. FIR) SF, we can define the galaxy luminosity related to the current SF,  $L_{\text{SF}}$ . At  $z = 0$ , the star-formation LFs (LFs of  $L_{\text{SF}}$ ) of UV and IR-selected samples are consistent with each other. We also found that the  $L_{\text{SF}}$ -dependence of the extinction is a linear relation between  $L_{\text{TIR}}/L_{\text{FUV}}$  and  $L_{\text{SF}}$ . Then, we obtained the star-formation LFs at  $z = 0.7$  and 1.0. While they agree with each other at  $z = 0.7$ , at  $z = 1.0$  the UV star-formation LF becomes significantly lower than that of the IR at  $L_{\text{SF}} > 10^{11} L_{\odot}$ . This clearly indicates that the luminous IR galaxy (LIRG) populations are missed in the UV, and they contain more than a half of the SF at  $z = 1.0$ . We also discovered that the high- $z$  extinction property is not very different from the local one, except the increase of low-extinction galaxies. Thus, the rise and fall of the LIRGs is the key event explaining the evolution of the visible and hidden SF in the Universe.