Astrophysics > Cosmology and Extragalactic Astrophysics

GOODS-Herschel Measurements of the Dust Attenuation of Typical Star-Forming Galaxies at High Redshift: Observations of UV-Selected Galaxies at z~2

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We take advantage of the sensitivity and resolution of Herschel at 100 and 160 micron to directly image the thermal dust emission and investigate the infrared luminosities, L(IR), and dust obscuration of typical star-forming (L*) galaxies at high redshift. Our sample consists of 146 UV-selected galaxies with spectroscopic redshifts 1.5<z<2.6 in the GOODS-North field. Supplemented with deep Very Large Array (VLA) and Spitzer imaging, we construct median stacks at the positions of these galaxies at 24, 100, and 160 micron, and 1.4 GHz. The comparison between these stacked fluxes and a variety of dust templates and calibrations implies that typical star-forming galaxies with UV luminosities L(UV)>1e10 Lsun at z~2 are luminous infrared galaxies (LIRGs) with a median L(IR)=(2.2+/-0.3)e11 Lsun. Typical galaxies at 1.5<z<2.6 have a median dust obscuration L(IR)/L(UV) = 7.1+/-1.1, which corresponds to a dust correction factor, required to recover the bolometric star formation rate (SFR) from the unobscured UV SFR, of 5.2+/-0.6. This result is similar to that inferred from previous investigations of the UV, H-alpha, 24 micron, radio, and X-ray properties of the same galaxies studied here. Stacking in bins of UV slope implies that L* galaxies with redder spectral slopes are also dustier, and that the correlation between UV slope and dustiness is similar to that found for local starburst galaxies. Hence, the rest-frame 30 and 50 micron fluxes validate on average the use of the local UV attenuation curve to recover the dust attenuation of typical star-forming galaxies at high redshift. In the simplest interpretation, the agreement between the local and high redshift UV attenuation curves suggests a similarity in the dust production and stellar and dust geometries of starburst galaxies over the last 10 billion years.

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