Hot-dust Luminosity Density and its Evolution in the Last 7.5 Gyr

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Introduction

We study the contribution of hot-dust to the luminosity density of galaxies and its evolution with cosmic time.

The study of dust is crucial for the study of galaxies because it re-radiates in the infrared the ultraviolet radiation that originates from stellar activity or accretion in supermassive black holes.

The results presented in this poster are the continuation of the work shown in Messias et al. (2013), and are part of an on-going master-thesis work.

A ΛCDM cosmology is assumed, with $H_0 = 70$ km s^{-1} Mpc^{-1}, $\Omega_M = 0.3$, $\Omega_\Lambda = 0.7$.

Observations

This work utilized Herschel observations, using data of the HerMES project over an area of 2 deg^2 covered by the COSMOS field.

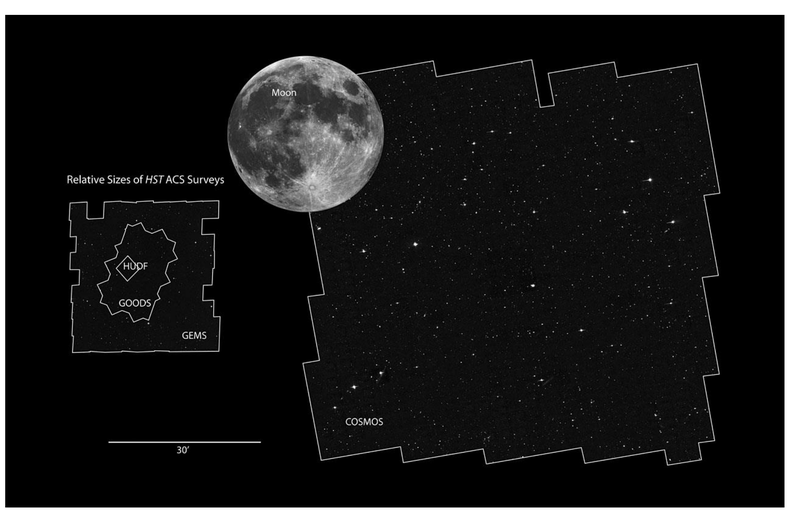

Figure 1 – COSMOS field relative size compared with the Moon and other surveys.

Method

A simple stacking method approach was constructed, using the weighted median to obtain the final stacked images.

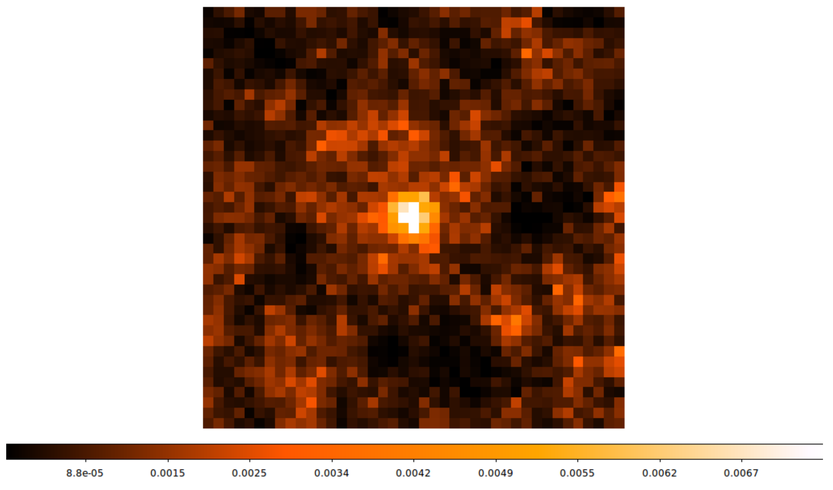

Figure 2 – Example of output image from the stacking method (All sources - Total).

From these images, the flux was obtained and converted to luminosities.

The data from Messias et al. (2013) was used to relate to this luminosity, and so, obtain a relation between cold and hot dust, and its evolution with redshift (Figure 3).

Results

We obtain a trend that is in compliance with what we were expecting, i.e., based on the results from Messias et al. (2013), the cold-to-hot luminosity ratios should increase with decreasing redshift.
However, we noticed that this increase is not very significant. This may be induced by evolution of characteristic temperatures with redshift. As a result, the next step will be to stack all the available Herschel bands and fit a grey-body model to the stacked fluxes, enabling the comparison between the FIR and hot-dust luminosities.

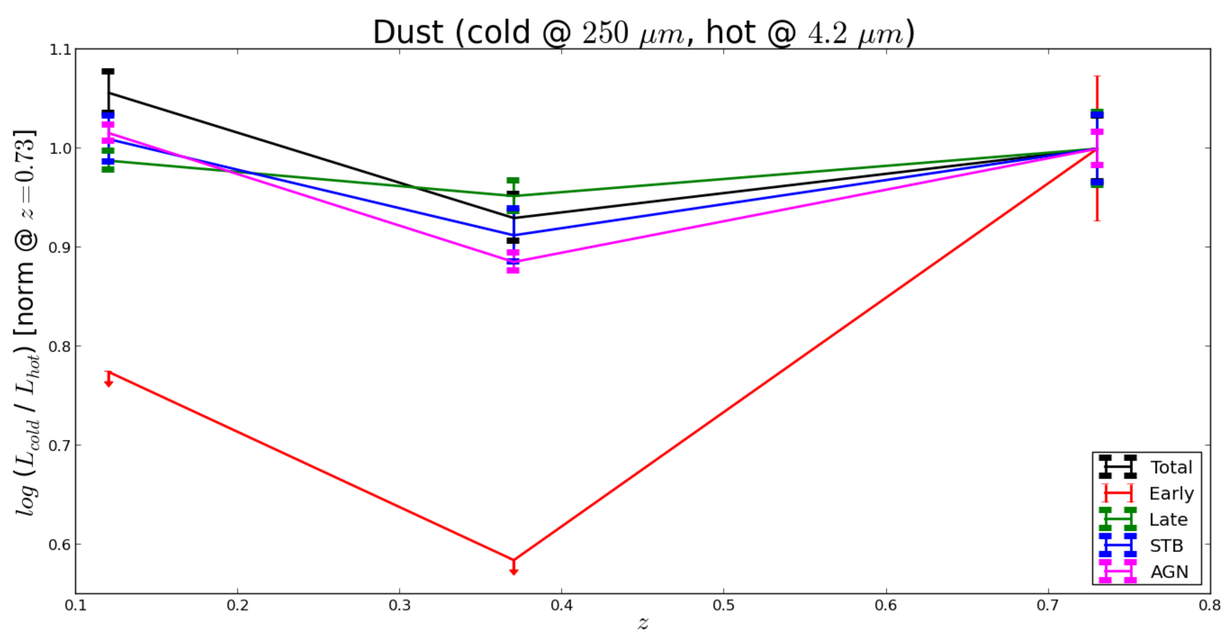

Figure 3 – Luminosity relation between cold dust-continuum at rest-frame 250 μm and hot dust-continuum at 4.2 μm. The black line corresponds to all galaxies in the field, the red line corresponds to the Early Type galaxies, the green line corresponds to the Late Type galaxies, the blue line corresponds to Starburst galaxies, and finally, the magenta line corresponds to AGNs. The arrows in the Early Type line are upper limits for those two points.

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