

Dust growth in the interstellar medium can account for a huge amount of dust in z~6 QSOs

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QSOs (galaxies hosting a super-massive black-hole) at redshift z~6, which is the epoch less than 1 billion years after the Big Bang, already have a huge amount of dust as a few $10^8 M_{\text{sun}}$. The origin of the dust is under debate because the age of the universe is less than a typical life-time of asymptotic giant branch (AGB) stars which are thought to be the main producer of dust in the Milky Way. Supernovae can produce dust but they destroy it by shock waves in the same time. Draine (2009) proposed an importance of dust growth in the interstellar medium (ISM). Here, I show that the growth in the ISM is indeed rapid enough to produce the observed huge amount of dust in QSOs based on a detailed evolution model of elements and dust in galaxies.

Keywords: chemical evolution of galaxies.

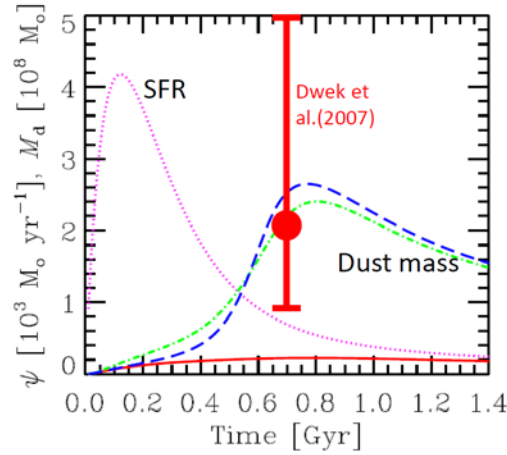


Figure 1. Time evolutions of star formation rate (SFR; dotted curve) and dust mass (solid, dashed, and dot-dashed curves depending on a balance between dust grown in the ISM and destruction by supernovae).

References

- [1] B.T. Draine to appear in "Cosmic Dust -- Near and Far", ed. Th. Henning, E. Grun, J. Steinacker (ASP Conf. Series) [arXiv:0903.1658] (2009)