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## An Empirical Determination of the Dust Mass Absorption Coefficient, $\kappa_d$ , and its Variation Within Nearby Galaxies

*Thursday, 14 June 2018 14:35 (25 minutes)*

With the advent of large far-infrared and submillimetre facilities such as Herschel, Planck, JCMT, and especially ALMA, dust now provides an indispensable way to study the evolution of galaxies. In particular, our ability to observe large areas of the submillimetre sky quickly (along with the advantageous effects of negative- $k$ -correction and lensing) mean that dust observations are increasingly used as a proxy to study star-formation rates, gas masses, and chemical evolution - which are impractical to observe directly for such substantial numbers of galaxies.

However, our ability to exploit dust observations in this way is predicated on a simple assumption - that we can actually use observations of dust emission to infer dust masses. But the dust mass absorption coefficient,  $\kappa_d$ , is uncertain to (at best!) an order of magnitude. Worse still, this forces us to treat  $\kappa_d$  as being constant both between galaxies, and within them - which of course cannot be true in reality. Pinning down  $\kappa_d$ , and how it varies, is therefore vital.

I will present a simple empirical method for determining the value of  $\kappa_d$  in galaxies, which exploits the fact that the dust-to-metals ratio in galaxies exhibits minimal variation in high- and intermediate-metallicity systems. This method puts new empirical constraints on global values of  $\kappa_d$ , providing an important counterpoint to theoretical and laboratory models.

I will also present the first ever resolved maps of  $\kappa_d$ , obtained by applying the method in a pixel-by-pixel manner to well-resolved nearby galaxies. These maps provide strong observational evidence for variation of  $\kappa_d$  within galaxies.

### Consider for a poster?

Yes

**Primary authors:** CLARK, Christopher (Cardiff University); Dr DE VIS, Pieter (IAS Paris)

**Presenter:** CLARK, Christopher (Cardiff University)

**Session Classification:** Dust as a tracer in the Milky Way and local galaxies

**Track Classification:** Dust as a tool