

CORESHINE : a tracer of grain growth in dark clouds

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Scattering is a well-known phenomenon in the optical domain and is revealed by reflection nebulae or some bright-rimmed Bok globules. In the 90's, with the advent of near infrared (NIR) cameras, scattering from cloud envelopes was also discovered in the JHK bands and nicknamed "cloudshine" but nobody tried to search for scattering in the mid infrared (MIR) because no signs of it were seen in ISOCAM data and standard dust scattering efficiency is known to drop by several orders of magnitude at wavelengths beyond $3 \mu\text{m}$. It was therefore serendipitously that we discovered this effect in L183 observations made with the Spitzer IRAC instrument. We found light in emission in the 3.6 and $4.5 \mu\text{m}$ channels in coincidence with the absorption peak seen in the $8 \mu\text{m}$ channel map (see Fig.1). We tested several possibilities and were left with only one: grains must grow by a factor 5 to 10 in size to explain this efficient scatter. Because MIR light penetrates deeply into the clouds, it can reach the cloud cores before being efficiently scattered back to us. Therefore we named this effect "coreshine". We investigated over 200 sources from both the Spitzer Archive and a new warm Spitzer mission program to check the frequency of the phenomenon and found over 50% of the cases to be positive, which is possibly only a lower limit. We see differences depending on the Galactic regions we investigate. Taurus is a highly successful target while the Galactic plane is too bright to let coreshine appears in emission. We will present coreshine as a grain growth tracer and we will discuss its absence in the Gum/Vela region, which would indicate that big grains have been recently destroyed by the supernova blast wave. Finally, we will discuss the prospect for future coreshine searches with Spitzer versus WISE, Akari and JWST.

Fig.1 Spitzer/IRAC images. **left:** $3.6 \mu\text{m}$, **middle:** $4.5 \mu\text{m}$, **right:** $8 \mu\text{m}$. Contours mark 5 and $10 A_v$.

