

Far-infrared dust opacity and visible extinction in the Polaris Flare

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The extinction derived from star counts is a factor 2 lower than the extinction derived from far-infrared dust opacity in the Polaris molecular cloud. This cloud is known to be particularly cold (14 K) and we propose to explain the discrepancy between the two extinction estimates by a different τ_{FIR}/A_V between the diffuse atomic medium (warm) and the Polaris molecular cloud (cold). We conclude the τ_{FIR}/A_V of the cold dust in Polaris is on average 4 times higher than for the dust in atomic cirrus. This change in dust property could be interpreted by a growth of fluffy particles within low opacity molecular cirrus clouds such as Polaris. This work suggests that variations in dust emissivity must be taken into account to estimate A_V from dust emission wherever cold infrared emission is present (i.e. molecular clouds).

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