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Revealing the dust grain sizes in the envelope of Per-emb-50

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Disks and envelopes around protostars play a fundamental role in the process of planet formation, since they contain the ingredients that will form planets. However, it is not yet clear at which stage of the star and planet formation process dust grains start to efficiently coagulate and evolve from small solid particles to macroscopic dimensions.
We studied the Class I protostar, Per-emb-50, at 1.3mm with SMA and 2.7mm with NOEMA in order to determine the spectral index $\alpha_{\rm mm}$ in the envelope region on scales 400-3000 AU. The data analysis show a high value for $\alpha_{1.3-2.7{\rm mm}}$m, which implies that there is no evidence of mm-sized dust grains in the envelope. To understand the dust properties in more detail, we performed a radiative transfer modeling of the source and found a maximum grain size of a few hundred microns.
The current observations on Per-emb-50 confirm that there are no mm sized grains in the envelope, contrary to previous studies on similar sources where mm size grains have been found. This would imply that the grain growth on YSO's is highly affected by the environment and dynamica history of the source.

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