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**A large-scale shock model for chondrule formation.**

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In recent years many models of chondrule formation have been proposed. One of those models is the processing of dust in shock waves in protoplanetary disks. There, the dust and the chondrule precursors are overrun by shock waves, which heat them up by frictional heating and thermal exchange with the gas.

We revised the model by [1] and focused on the down-stream boundary condition. We showed that the thermal histories of particles in one-dimensional shock waves in optically thick disks are inconsistent with chondrule formation. The cooling in those disks is too inefficient to allow for the required rapid cooling rates.

Therefore, we introduced an energy loss term to estimate the radiative losses in lateral directions out of the disk plane. We showed that chondrules can only be formed via shock waves in optically thin regions where the particles can freely lose energy by thermal radiation.

[1] Desch, S.J. & Connolly H.C., Jr. (2002) M&PS 37, no. 2, 183–207.

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