

Uspjeh hrvatske astrofizike

Autor Slobodan Danko Bosanac
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Dr. Dejan Vinkoviæ sa Sveuèilišta u Splitu objavio je èlanak u èasopisu Nature o mehanizmu miješanja prašine oko mladih zvijezda, kao prvi korak prema stvaranju planeta.

Letter

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Radiation-pressure
mixing of large dust grains in protoplanetary disks

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Abstract

Dusty disks around young stars are formed out of interstellar dust that consists of amorphous, submicrometre grains. Yet the grains found in comets¹ and meteorites², and traced in the spectra of young stars³, include large crystalline grains that must have undergone annealing or condensation at temperatures in excess of 1,000 K, even though they are mixed with surrounding material that never experienced temperatures as high as that⁴. This prompted theories of large-scale mixing capable of transporting thermally altered grains from the inner, hot part of accretion disks to outer, colder disk regions^{5, 6, 7}, but all have assumptions that may be problematic^{8, 9, 10, 11, 12}. Here I report that infrared radiation arising from the dusty disk can loft grains bigger than one micrometre out of the inner disk, whereupon they are pushed outwards by stellar radiation pressure while gliding above the disk. Grains re-enter the disk at radii where it is too cold to produce sufficient infrared radiation-pressure support for a given grain size and solid density. Properties of the observed disks suggest

that this process might be active in almost all young stellar objects and young brown dwarfs.