RAPID COOLING OF DUSTY GAS IN ELLIPTICAL GALAXIES


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abstract

We propose a stellar origin for the central dust clouds observed in most giant elliptical galaxies. Dusty gas ejected from evolving red giant stars in E or cD galaxies can cool rapidly even after entering the hot, X-ray emitting gas. Cooling by thermal collisions with dust grains can be faster than either the dynamical time in the galactic potential or the grain sputtering time. Some grains survive in the cooled gas. Dusty stellar outflows cool more efficiently in the central regions where the stellar metallicity is higher. Mergers with gas and dust-rich dwarf galaxies may occasionally occur but are not required to explain the observed dust clouds.