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Singular Energy Distributions in Granular Media ELI BEN-NAIM, Los Alamos National Laboratory, ANNETTE ZIPPELIUS, Georg-August-Universitat — We study the kinetic theory of driven and undriven granular gases, taking into account both translational and rotational degrees of freedom. We obtain the high-energy tail of the stationary bivariate energy distribution, depending on the total energy E and the ratio $x = \sqrt{E_w/E}$ of rotational energy E_w to total energy. Extremely energetic particles have a unique and well-defined distribution $f(x)$ which has several remarkable features: x is not uniformly distributed as in molecular gases; $f(x)$ is not smooth but has multiple singularities. The latter behavior is sensitive to material properties such as the collision parameters, the moment of inertia and the collision rate. Interestingly, there are preferred ratios of rotational-to-total energy. In general, $f(x)$ is strongly correlated with energy and the deviations from a uniform distribution grow with energy. We also solve for the energy distribution of freely cooling Maxwell Molecules and find qualitatively similar behavior.

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