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Random Packing Density of Platonic Solids JESSICA BAKER, ARSHAD KUDROLLI, Department of Physics, Clark University — Motivated by the relation between particle shape and packing, we investigate the volume fraction occupied by faceted particles as a function of number of particle sides. Such particles are arguably better representative of natural sand than spheres. For simplicity, we focus on the highly symmetric five Platonic solids which are polygons with congruent sides, vertices and angles, and experimentally measure their packing densities. Plastic dice with 4, 6, 8, 12, and 20 sides are fluidized or shaken randomly to find configurations corresponding to the loosest stable packing and densest packing, respectively. We find that the packing fraction obtained by both protocols peak at the cube and then monotonically decrease below the corresponding values obtained for spheres. Interestingly, the overall trend is similar but systematically lower that the maximum volume fractions reported for frictionless platonic solid particles. The effect of friction of the particles and the shape of the boundary shape on observed packing fractions is also investigated.

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