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How an aggregation process helps us understanding solid fragmentation VLEDOUTS ALEXANDRE, NICOLAS VANDENBERGHE, EMMANUEL VILLERMAUX, IRPHE — We report on an experiment intended to understand the fragmentation of a ring composed of cohesive solid spheres (magnets in dipolar interaction). At initial time, the ring is forced to expand radially and the spheres separate from each other. Because of the dipolar attractive force between the spheres, their uniform angular distribution is unstable and the spheres aggregate with each other to form fragments. We record the full dynamics of the spheres assembly and we show that the final fragment size distribution is the signature of the aggregation process giving birth to it. In particular, we introduce a Weber number We, based on the radial velocity of the ring, the density of the spheres and their magnetization. We find that the final mean fragment size scales like $We^{-1/3}$ and that the standard deviation of the fragments distribution is proportional to it. We will also discuss the relation between our findings and the fragmentation of elastic rings studied by Sir N. Mott.

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