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Aggregation of magnetic particles in turbulence HECTOR DE LA ROSA, Aix- Marseille University - IRPHE, GAUTIER VERHILLE, PATRICE LE GAL, Aix- Marseille University - CNRS - IRPHE — The formation of particle aggregates in flows is an ubiquitous process in industrial and environmental contexts. The aim of our study is to describe the saturation of the aggregation process of inertial particles in turbulence, i.e. when the particles are larger than the Kolmogorov dissipative scale η_k. For this purpose, we seeded a high Reynolds number turbulent von Karman flow ($Re \sim 10^6$, $\eta_K \sim 10$ μm) with millimeter size nearly neutrally buoyant magnetic particles. Each magnetic dipole imposes a torque and a force on the other magnets at the origin of the cohesion of the aggregates. On the contrary turbulent fluctuations impose an external stress which may fragment the aggregates. We study the statistics of the size distribution of the aggregates. Assuming a Kolmogorov inertial scaling for the turbulent velocity fluctuations, we predict theoretically the average size of the aggregates as a function of the turbulence intensity. A scaling law is deduced from the theoretical model and is verified by our experimental results.

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