

CEA - Saclay 91191 Gif-sur-yvette Cedex  
**Service de Physique de l'Etat Condensé**  
**SÉMINAIRE**

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**Mercredi 18 avril 11h15**

**Orme des Merisiers SPEC Salle Itzykson, Bât.774**

**Preferential concentration of inertial particles in  
turbulent flows**

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Particle laden flows are of relevant interest in many industrial and natural systems. When the carrier flow is turbulent, a striking feature is the tendency of particles denser than the fluid to inhomogeneously distribute in space, forming clusters and depleted regions. I will present an experimental characterization of preferential concentration and clustering of inertial particles in homogenous isotropic grid generated turbulence. We introduce a new analysis tool, based on Vorono diagrams, which allows not only to quantify preferential concentration, but also to efficiently characterize the structure and dynamics of particle clusters . The role of particle inertia (given by the Stokes number, which is the ratio of particles viscous relaxation time to the dissipation time of the carrier flow), Reynolds number of the flow and seeding density are investigated. Several results formerly obtained from various data processing techniques are successfully recovered and further analyzed with Vorono tessellations as the main single tool. I will emphasize the maximum preferential concentration for particles with Stokes numbers around unity and the self-similar nature of clustering as well as new unpredicted results concerning clusters inner concentration dependence on Stokes number and global seeding density, reminiscent of possible collective effects. Finally, I will address the question of the relevance of the Stokes number as an indicator of preferential concentration, by considering the case of large neutrally buoyant particles.

A coffee break will be served at 11h00. The seminar will be given in English.

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