

SHORT COURSE :
Inhomogeneous Distribution of Inertial Particles in Turbulence

LECTURER
Itzhak Fouxon, Yonsei University, South Korea

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VENUE :
NCSR Demokritos
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ABSTRACT

During the last decade significant progress occurred in the study of behavior of small particles immersed in the turbulent flow. The range of applications of this problem is huge: from rain formation in the warm clouds to formation of planetesimals in space, from inner combustion engines to reactions that occur in the presence of turbulence and so on and so further. Unprecedentedly, theoretical predictions hold directly for natural or laboratory turbulence. The derivation relies only on robust properties of turbulence like smoothness on the scale of the particles. The predictions were fully confirmed experimentally. The results have fundamental significance telling that one of the defining properties of turbulence - mixing particles uniformly over the flow - is limited. Since this course started the theory was used to describe quite different physical phenomenon - patchiness of phytoplankton cells in marine environment (Nature Communications 4 2148, 2013). The course demands only the knowledge of basics of analysis. Fractals are learnt directly by studying particles in turbulence.

THE LECTURES PROGRAM

11:00 - 12:00	Introduction to the problem of rain formation in warm clouds - relevance of air turbulence
12:00 - 13:00	Fractal distribution of small particles in turbulence - centrifuge mechanism, statistics and practical implications
13:00 - 14:00	Lunch
14:00 - 15:00	Multi-fractality and limitations of the concept of turbulent mixing
15:00 - 15:15	Discussion

Dr. Fouxon works in the study of turbulence for about 15 years. The known works include rain formation in clouds (published in Nature), universal description of statistics of finite-time Lyapunov exponents, turbulence in dilute polymer solutions, granular materials and new scaling laws in turbulence. Besides work in Yonsei University, Dr. Fouxon is lecturer and scientific consultant in Weizmann Institute of Science.