

Colloquia

SPRING 2016

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Giovanni Volpe

Bilkent University, Ankara, Turkey

Active Matter

day

APR 06, 2016 WED

location

EE01

time

15:40

ABSTRACT

Active Brownian particles, also referred to as microswimmers and nanoswimmers, are biological or manmade microscopic and nanoscopic particles that can self-propel. Because of their activity, their behavior can only be explained and understood within the framework of nonequilibrium physics. In the biological realm, many cells perform active Brownian motion, for example, when moving away from toxins or towards nutrients. Inspired by these motile microorganisms, researchers have been developing artificial active particles that feature similar swimming behaviors based on different mechanisms; these manmade micro- and nanomachines hold a great potential as autonomous agents for healthcare, sustainability, and security applications. With a focus on the basic physical features of the interactions of active Brownian particles with a crowded and complex environment, this seminar will provide a guided tour through the basic principles of active matter, the development of artificial self-propelling micro- and nanoparticles, and their application to the study of non-equilibrium phenomena, as well as the open challenges that the field is currently facing.

Giovanni Volpe was awarded a Master Degree in Telecommunications Engineering from the University of Padova (Italy) and a Ph.D. degree in Physics from ICFO-The Institute of Photonic Sciences (Barcelona, Spain) for his work on optical trapping done in the group of late Prof. Dmitri Petrov, work for which he received the "2009 ICFO PhD Thesis Award" for the Best ICFO Doctoral Dissertation. Later, as a postdoctoral researcher in the group of Prof. Clemens Bechinger at the Max Planck Institute for Intelligent Systems (Stuttgart, Germany), he shifted his research focus towards soft matter, obtaining far-reaching results in the development of a new class of light-activated artificial microswimmers and in the study of Brownian motion in diffusion gradients. Since 2012, he has been an Assistant Professor at the Physics Department and the National Nanotechnology Research Center at Bilkent University (Ankara, Turkey). Dr. Volpe has co-authored more than 50 peer-reviewed scientific publications and the book "Optical Tweezers: principles and Applications" (Cambridge University Press, 2015). He has been an active member of the Optical Society (OSA) since the earliest stages of his career, activity for which he was awarded the 2012 Outstanding OSA Young Professional and the 2016 OSA Ambassador recognition.

The Physics Colloquia are designed to address a non-specialist, broad audience and introduce topics of contemporary research through lectures by leading experts. We warmly invite all members of the student body, including undergraduates enrolled in any programme.

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