BuildMoNa

UNIVERSITÄT LEIPZIG

SCIENTIFIC AND METHOD MODULES

Module name	**Complex Nanostructures: Hot Nanoparticles**
Number	2013-T3
Aims	The module aims to provide participants with some understanding of the chemical and physical properties of nanoparticles and nanostructures, such as their synthesis, experimental control, theoretical description, numerical modeling, specific nano-scale effects and interactions, and emerging complexity. The module gives an interdisciplinary perspective covering chemical, physical, experimental and theoretical aspects.
Basics	Basic knowledge covered in basic modules B3 and B1
Contents	Aspects of driven and self-propelled transport of nanoparticles and nanostructures, thermal gradients and thermodynamic forces, (self-) thermophoresis, effective temperatures in driven systems, hydrodynamics, wet electrostatics, topological and geometric effects, energy transfer mechanisms and strong light-matter interactions, the emergence of complexity, collective dynamics, networks and swarm properties.
Methods	Single-particle techniques, nano-optics, theory, computer simulations
Type	Two-day block course/ bi-yearly recurrence with modification
Date (month/year)	28.-30.05.2013
Time	See page 2
Work load	15 hours presence/ 45 hours self-study
Examination	written exam, 12 June 2013
Credit points	2
Responsible scientists	Cichos, Kroy, Mayr
International guest lecturers	Prof. Dr. Alois Würger (Université Bordeaux 1), Prof. Dr. Giovanni Volpe (Bilkent University, Ankara), Prof. Dr. Eric Bertin (ENS Lyon), Dr. Samuel Sanchez Ordonez (IFW Dresden), Prof. Dr. Kirsten Martens
Industrial partners	
Recommendations for literature, e-learning	http://dx.doi.org/10.1039/b918598d; http://prl.aps.org/abstract/PRL/v99/i4/e048102; http://www.sciencemag.org/content/339/6122/936.full.html; http://dx.doi.org/10.1039/c1sm05960b; http://dx.doi.org/10.1088/0953-8984/24/28/284129; http://arxiv.org/abs/1302.5787; http://arxiv.org/abs/1212.6504 ; http://dx.doi.org/10.1146/annurev.fl.21.010189.000425 ; http://dx.doi.org/10.1088/0034-4885/73/12/126601; http://dx.doi.org/10.1103/PhysRevLett.103.260602 ; http://dx.doi.org/10.1103/PhysRevLett.109.268701; http://dx.doi.org/10.1103/PhysRevLett.109.098101 ; http://dx.doi.org/10.1088/1751-8113/42/44/445001

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SCHEDULE for Module 2013-T3

Time	Lecturer	Programme	Location
28 May 2013			
9:00-10:00	Cichos/Kroy/Mayr	Introduction	ITP, Brüderstr. 16, SR 113
10:00-11:30	S. Sanchez Ordonez	How to fabricate and design self-propelled micromotors	SR 113
11:30-13:00	A. Würger	Self-propelling Janus particles: temperature field and hydrodynamic aspects	SR 113
Lunch Break			
14:00-15:30	E. Bertin	Hydrodynamic equations for point-like self-propelled particles	SR 113
15:30-17:00	S. Sanchez Ordonez	Potential applications, challenges and future of micromotors: from individual motors to collective behaviour	SR 113
17:00-18:00	All Participants	Discussions	SR 113
Dinner			
29 May 2013			
9:00-10:30	G. Volpe	Active Brownian motion tunable by light	SR 113
10:30-12:00	A. Würger	Self-propelling Janus particles: temperature field and hydrodynamic aspects	SR 113
Lunch Break			
13:00-14:30	E. Bertin	Hydrodynamic equations for point-like self-propelled particles	SR 113
14:30-16:00	G. Volpe	Chiral active microswimmers	SR 113
16:00-17:00	K. Martens	Effective temperatures in driven systems	SR 113
30 May 2013			
14:00-18:00	Lab Course	Self-phoretic colloidal particles	Linnestr. 5,

Didactic elements:
Lecture, discussions, practical training in the lab etc.

Expected performance:
Active participation in discussions, lab training, exam