



## Introduction: *François Peeters*

- Head of the research group: Condensed Matter Theory (CMT)
- Coordinates:

Prof. dr. Francois PEETERS  
University of Antwerp (CGB)  
Condensed Matter Theory  
Department of Physics (U213)  
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www-pages: <http://www.ua.ac.be/cmt>

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## Condensed Matter Theory

**ZAP: Peeters François  
Partoens Bart  
Milosevic Milorad**

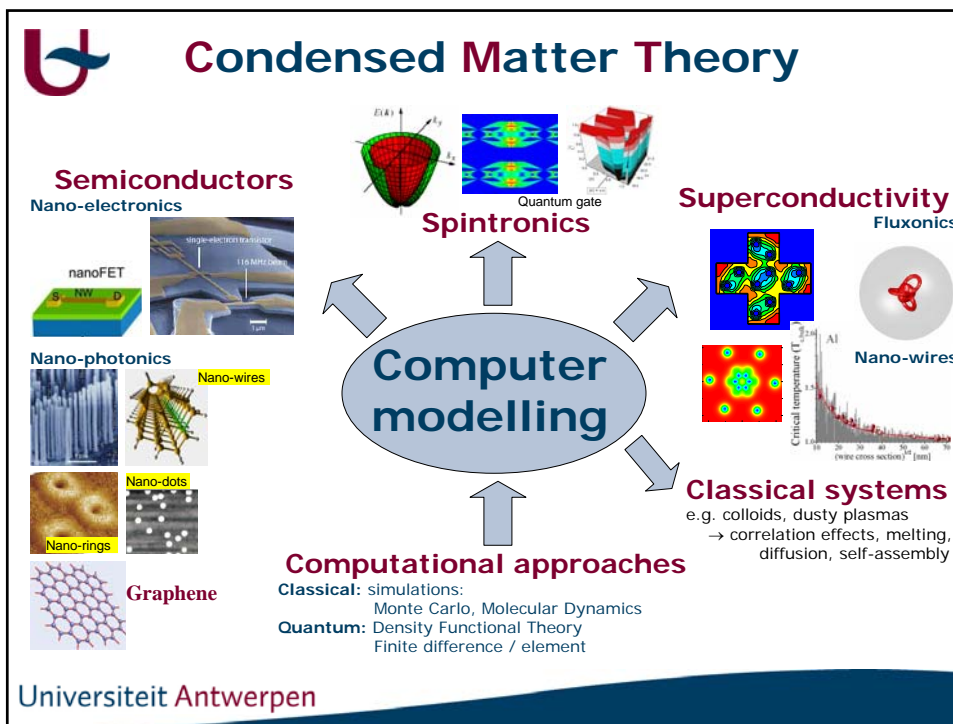
Part time: Magnus Wim (IMEC)  
Emeritus Prof.: K. Michel  
Visiting professor: 2  
Postdocs: 7  
PhD-students: 15  
Visitors: 3

**Location: Campus Groenenborger  
U2  
<http://www.ua.ac.be/cmt>**

***International team:***

Belgium: 10  
Brazil: 3  
Argentina: 1  
Canada: 1  
Hungary: 1  
Poland: 1  
China: 3  
Moldova: 1  
Russia: 1  
Serbia: 4  
Ukraine: 1  
Uzbekistan: 3  
Vietnam: 1

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**Collaborators in the area of superconductivity**

**University of Antwerp**  
B. Baelus, M. Milošević, I. Marmoros, S. Yampolski, L. Cabral, G. Berdiyrov, A. Elmuradov, V. Misko, A. Shanenko, M. Croitoru, R. Geurts, D. Sun, Y. Chen

**Theorists:**  
V.A. Schweigert (Russian Academy of Sciences, Novosibirsk)  
D. Vodolazov (Russian Academy of Sciences, Nizhny Novgorod)  
P. Deo (Bose Institute, Calcutta)  
J. Palacios (Valencia, Spain)  
M. Doria, A. Romaguera (Rio de Janeiro, Brazil)  
A. Hernandez, D. Dominguez (Bariloche, Argentina)

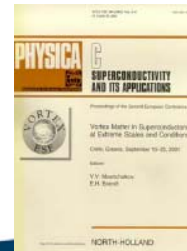
**Experimentalists**  
A.K. Geim, I. Grigorieva (Univ. of Nijmegen, NL; since 2001: Univ. of Manchester, UK)  
V. Moshchalkov group at KULeuven (Belgium)  
L. Piraux group at UCL (Belgium)  
A. Kanda, K. Kadowaki (Tsukuba, Japan)  
Arutyunov (Jyvaskyla, Finland)  
W. Kwok, U. Welp, G. Crabtree (Argonne National Laboratory, USA)

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## ESF-network: Vortex Matter

- ESF-network on vortex matter (1999-2006)  
*"VORTEX MATTER IN SUPERCONDUCTORS AT EXTREME SCALES AND CONDITIONS"*  
Coordinated by: Prof. V. Moshchalkov (KUL, Belgium)  
<http://fys.kuleuven.be/vsm/projects/vortex/>
- ESF-JSPS network on vortex matter (2007-2011)  
*Global research networking: "Nanoscience and Engineering in Superconductivity–NES"*
- Workshops (proceedings → Physica C):
  - Vortex I (1999) – Crete (Greece)
  - Vortex II (2001)
  - Vortex III (2003)
  - Vortex III (2005)
  - Vortex IV (2007) – Rhodes (Greece)



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EUROPEAN SCIENCE FOUNDATION

ESF Research Networking Programme  
Nanoscience and Engineering  
in Superconductivity

### 15 Countries (2007-2012)

AT	Austria
BE	Belgium
CH	Switzerland
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
IT	Italy
NL	the Netherlands
NO	Norway
SE	Sweden
SLO	Slovakia
UK	UK

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## Overview of tutorial lectures

- I. Introduction to superconductivity  
History. Basic properties. Ginzburg-Landau equations. London approximation. Numerical approaches
- II. Mesoscopic disks and rings  
Geometry determines the properties of the SC system
- III. Nanostructured superconducting films  
Manipulating vortices through nanoengineering of holes, blind holes and pillars. Fluxonic cellular automata. Novel vortex lattice structures.
- IV. Hybrid systems  
Ferromagnetic disks on top of a SC film: manipulation of magnetic field profile → i.e. the vortex structure (VAV-states)
- V. 3D mesoscopic structures  
Sphere, hollow sphere, cone, cylinder, wire with constriction