



DiStruc 1st Scientific Training Workshop

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Supervisory Board Meeting

21-24 September 2015, Heraklion, Crete



Organising Committee

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A. Useful info:

Venue

The conference will take place at the main building of the Foundation for Research and Technology, Hellas (FORTH), **Room 1**, which is located about 8 km southwest of Heraklion, close to the village of Voutes, and next to the University of Crete. The exact address is Nikolaou Plastira 100, Vassilika Vouton.

Getting around

To and from the airport

The airport of Heraklion, (Kazantzakis International Airport, HER) is located 4km east of the city centre.

- **TAXI service** is provided just outside the airport. A taxi ride from the airport to the city centre takes about 10-15 minutes and costs approximately € 12-15. A taxi ride from FORTH to the airport takes 15-25 minutes and costs around €18. If you need to book a taxi you can call +30 281 400 3084, +30 281 036 1363 or +30 281 400 3084
- **BUS:** Lines 6, 10 and 31 will take you to the city centre. Ask the driver for bus stop “Platia Eleftherias”- Astoria Liberty Square. The duration of the ride is approximately 15-20 minutes and tickets can be purchased in the airport building.

To and from the workshop venue

Bus transfer from the designated meeting point (Plateia 18 Anglon, Πλατεία 18 Άγγλων) in the city centre to the workshop venue will be provided to all participants. You can see the meeting point on the map provided.

The bus will depart at 8:30.



In case you miss the bus, you can use the local buses or taxis:

Taxi

From Heraklion city centre to FORTH:

The most convenient taxi queue is at "Eleftheria's Square" ("Platia Eleftherias" in Greek).

A taxi ride takes about 20-30 minutes and costs approximately € 12

Bus

City Buses (blue) serving the city of Heraklion from early morning until late evening. **Tickets** should be purchased before entering the bus and validated on board. One-way tickets costing € 1,70 can be purchased from most kiosks around the downtown area. The duration of each trip is approximately 40 minutes.

Information: (+30) 2810 226065 and (+30) 2810 220795. Web: <http://astiko-irakleiou.gr/>

There are two bus routes to and from FORTH (ITE in Greek) several times per day:

- **Line 8**, the sign on the front of the bus reads ITE and operates from the airport/port to FORTH.

07:30, 08:40, 11:40, 14:10, 15:40, 17:30, 19:40, 21:10 (times shown are from Bus stop “Platia Eleftherias”-Astoria Liberty Square)

FORTH – to city centre:

08:00, 09:15, 12:15, 14:40, 16:10, 18:00, 20:00, 21:30

Please note that the times mentioned are approximate and you are advised to be at the bus stop 5 minutes earlier. The bus drops you off at FORTH premises.

- **Line 11**, the sign on the front of the bus reads ΠΕ. ΠΑΓΝΗ: From Heraklion city centre to PAGNI (ΠΑΓΝΗ in Greek, the University Hospital).

This line has a stop approximately 300 meters away from FORTH's entrance. In order to avoid missing the stop, please consult the bus driver by asking for the stop to FORTH (ITE in Greek). This service runs approximately every 15 minutes.

Where to eat

For those of you who will be arriving early on the Sunday and for Tuesday night, here is a list of some nice restaurants in Heraklion:

For raki (the traditional Cretan alcoholic drink) and the Cretan version of tapas:

- **“Ντιλι ντιλι”**, Address: Kagiampi street.
- **50-50**, Address: 20 Odos 1866.
- **Arenon-Thileon (Αρρενων-θηλεων)**, Address: Milatou & Perdikari.
- **Notio selas** (<http://www.notioselas.gr/>), Address: 13 Meramvelou street.

Other restaurants

- **Peskesi**, (<http://www.peskesicrete.gr/en/>), for traditional Cretan cuisine. Address: Kapetan Haralampi 6-8.
- **Ippokampos** for fresh fish. Address: Sofokli Venizelou 3.
- **Pastatempo** (<http://pastatempo.gr/>) for Italian cuisine. Address: Ionias 20 & Louka Petraki.



- **Erganos**, (<http://www.erganos.gr/>) for traditional Cretan and Mediterranean cuisine.
Address: Georgiadi 5 Oasi.
- **Kouzineri**, for a combination of local and international cuisine, mainly meat dishes. Address:
Marineli Str. 11.

Banks

Credit and Debit Cards issued in countries other than Greece can be used at cash machines freely, regardless the restrictions that apply for the Greek cards. Most hotels, shops and restaurants accept credit & debit cards.

If you experience any problems or you need any kind of assistance while in Heraklion, you can call:

+30 6937123083 (Irimi)

B. Programme

Day 1: Monday, September 21

- 09:00-10:30 **Dirk Aarts:** Welcome and Introduction to the Network
Short presentation by all **Beneficiaries and Partners**
- 10:30-11:00 Coffee break
- 11:00-13:00 Short presentations (10 min) by the **ESRs** introducing themselves
- 13:00-14:30 Lunch break
- 14:30-16:00 **Jan Mewis:** *Liquid crystalline polymers*
- 16:00-16:30 Coffee break
- 16:30-18:00 **Julia Yeomans:** *Introducing the statics and dynamics of Liquid Crystals*
- 20:30 Dinner, location TBA

Day 2: Tuesday, September 22

- 09:00-10:30 **Paul van der Schoot:** *Molecular theories for thermo- and lyotropic nematic liquid crystalline phase transitions*
- 10:30-11:00 Coffee break
- 11:00-13:00 **Patrick Davidson:** *X-ray and neutron scattering applied to soft condensed matter: an introduction*
- 13:00-14:30 Lunch break
- 14:30-16:00 Parallel Sessions: a. **Jan Mewis:** *Non-spherical particles*

b. **SB Meeting part I:** Recruitment, Reporting, Finances,
Consortium Agreement, Training

16:00-16:30 Coffee break

16:30-18:00 Parallel Sessions: a. **Activities:** Lab tour for the ESRs

b. **SB Meeting - part II:** Outreach, Secondments, Committees,
Website

Day 3: Wednesday, September 23

09:00-10:30 **Marisol Ripoll:** *Simulations of polymer solutions: bridging length scales*

10:30-11:00 Coffee break

11:00-13:00 **David Dunmur:** *Liquid crystals or structured fluids: a battle of words and images*

13:00-14:30 Lunch break

14:30-18:30 Team building activities: Visit to Knossos Palace.

20:30 Dinner @ Ligo krasi... ligo thalassa <http://www.ligokrasiligothalassa.gr/en>

Day 4: Thursday, September 24

09:00-10:30 **Maria Vamvakaki:** *Controlled polymer synthesis, end-grafted polymer chains and responsive polymers: an introduction*

10:30-11:00 Coffee break

11:00-12:30 **Pavlik Lettinga:** *In situ Rheology*

12:30-14:00 Lunch break

14:00-16:00 Discussions

Departure

C. Abstracts

1. Liquid Crystalline Polymers

Jan Mewis, Faculty of Engineering Science, KU Leuven, Belgium

Monday, September 21, 14:30-16:00

- a. Rheological behaviour of LCPs
- b. Phenomenological theory of the rheology of liquid crystals
- c. Doi-Hess molecular theory for LCPs
- d. Role of defects
- e. Experimental evidence, possible scaling relations
- f. Time effects and complications in LCPs
- g. Filled LCPs

2. Introducing the Statics and Dynamics of Liquid Crystals

Julia Yeomans, Rudolf Peierls Centre for Theoretical Physics, University of Oxford, UK

Monday, September 21, 16:30-18:00

An introduction to liquid crystals covering:

- liquid crystals and their many phases
- order parameters and the free energy
- elastic constants and the Frederik's transition
- anchoring
- topological defects
- nematohydrodynamics
- what's new?

3. Molecular theories for thermo- and lyotropic nematic liquid crystalline phase transitions

Paul van der Schoot, Department of Applied Physics, Technische Universiteit Eindhoven, the Netherlands

Tuesday, September 22, 09:00-10:30

There are two types of liquid crystal, lyotropic and thermotropic. Lyotropic liquid crystals are mixed systems consisting of a host fluid in which are dispersed colloidal or macromolecular particles. These particles are highly anisometric, that is, either elongated or flat. The main driving force for the spontaneous symmetry breaking is loss of translational entropy resulting from repulsive interactions between the particles. Thermotropic liquid crystals are pure fluids consisting of molecules of relatively low molecular weight. Here, liquid crystallinity is driven by anisotropic attractive van der Waals interactions between the molecules. In my lecture I shall discuss the two main classes of molecular theory that describe the transition between the isotropic and uniaxial nematic liquid crystalline phase, and highlight their similarities. These are the Maier-Saupe theory for thermotropic nematics and the Onsager theory for lyotropic nematics. Both are examples of self-consistent field theories.

4. X-ray and neutron scattering applied to soft condensed matter: an introduction

Patrick Davidson, Laboratoire de Physique des solides, Université Paris-Sud, France

Tuesday, September 22, 11:00-13:00

X-ray and neutron scattering are very popular techniques which provide information on the building blocks and the organization of condensed matter. They are widely applied to a variety of systems such as liquid crystals, polymers, colloids, and biomolecular assemblies. This introductory course will give a general overview of these techniques and will underline the possibilities and specificities of the different methods available. It will be illustrated by selected examples of scattering studies of different systems.

5. Non-spherical particles

Jan Mewis, Faculty of Engineering Science, KU Leuven, Belgium

Tuesday, September 22, 14:00-16:00

- a. Rheological phenomena with non-spherical particles
- b. Particle dynamics
 - a. Viscosity and viscoelasticity of relatively dilute systems
 - b. Concentration effects (maximum packing)
- c. Fibre rheology
- d. Platelets
- e. Shear thickening
- f. Non-spherical particles in viscoelastic media

6. Simulations of polymer solutions: bridging length scales

Marisol Ripoll, Theoretical Soft Matter and Biophysics, Institute of Complex Physics,

Forschungszentrum Jülich, Germany

Wednesday, September 23, 09:00-10:30

Static and dynamic properties of polymer solutions are determined by a vast number of particles, such that it is frequently not possible to provide satisfactory analytical approaches. Computer simulations have emerged as a powerful tool to study the properties of a large spectrum of physical, chemical, biological, and technical systems in a varied number of conditions.

In this lecture, I will introduce a first glimpse of the most important concepts for the computer simulations of complex fluids. The basic concepts and considerations of the most basic simulation methods will be briefly discussed; these are Monte Carlo (MC) and Molecular Dynamics simulations (MD). These methods are employed to provide very precise atomistic descriptions at the nanoscale, or alternatively coarse-grained descriptions for systems with larger relevant length scales.

Mesoscopic simulation methods will also be introduced in this lecture. These are methods developed to describe systems whose relevant length and time scales are separated by several orders of magnitude. Hydrodynamic interactions resulting from the underlying solvent particles are of fundamental importance to most soft matter systems, such that both solvent and solute need to be taken into account. In particular, I will introduce MPC (multiparticle collision dynamics), an especially efficient and advantageous method for the simulation of hydrodynamic polymer solutions.

7. Liquid crystals or structured fluids: a battle of words and images

David Dunmur, Department of Physics, University of Manchester, UK

Wednesday, September 23, 11:00-13:00

De Gennes, the 1991 Nobel Prize winner in physics, avoided the conflict and referred to soft condensed matter physics, or Soft Matter for short. By so doing, he brought together apparently diverse areas of investigation and launched a new area in the physics and chemistry of materials.

This contribution to the first Distruc Training Meeting will give a brief historical background to the area of liquid crystals and show the connections between thermotropic, lyotropic and colloidal systems. The important physical properties that are used to characterise the phases will be described, properties which in some cases can be exploited in applications.

The interpretation of anisotropic properties of liquid crystals and structured fluids in terms of molecular theories will be introduced using the concept of ordering matrices, as introduced by Saupe. The further complications of different molecular symmetries, shape and flexibility and specific molecular interactions will be mentioned.

Some of these concepts will be explored through two case studies: one old and on-going, and one new and controversial. The biaxial nematic phase has been the subject of many theoretical and experimental studies. One possible route to such a phase is through the formation of mixtures between rod-like and disc-like molecules, but the realisation of a biaxial nematic phase is not so easy.

Recently it has been found that molecules having a bent shape, either rigid or flexible, may form a new nematic phase variously called the twist-bend nematic phase, or the N_x phase. The current evidence for this phase will be reviewed.

In introducing the techniques it will become clear that a combination of these techniques with in situ rheology is experimental challenging. Nonetheless, I will show the wealth of possibilities that are nowadays available.

8. Controlled polymer synthesis, end-grafted polymer chains and responsive polymers: an introduction

Maria Vamvakaki, Department of Materials Science and Technology, University of Crete, Institute for electronic structure and Laser (IESL), FORTH, Greece

Thursday, September 24, 09:00-10:30

The lecture will cover topics related to the most commonly used polymerization methods, including addition vs condensation polymerization, “living” polymerizations, and controlled radical polymerizations. The effect of the polymerization method on the polymer characteristics (molecular weight, molecular weight distribution and copolymer composition) will be discussed. In the second part of the lecture, we will talk about end-grafted polymer chains using the “grafting to” and “grafting from” methods. Polymer brushes on flat and curved surfaces will be presented. Finally, in the third part we will briefly introduce stimuli-responsive polymers (i.e. pH- and temperature-responsive polymers, light responsive polymers, multi-responsive polymers, etc) and responsive surfaces and particles.

9. In situ Rheology

Pavlik Lettinga, Institute of Complex Systems , Forschungszentrum Julich, Germany, Department of Physics, KU Leuven, Belgium

Thursday, September 24, 11:00-12:30

In this course I will indicate which methods can be used to uncover the relation between the mechanical and structural response of complex fluids. First I will shortly introduce different scattering techniques that cover a broad range of length scales, using Neutron-, X-ray, and light scattering. Then I will discuss recent developments in light microscopy including the techniques leading to this year’s Nobel Prize in chemistry.