IOP Institute of Physics
Liquids and Complex Fluids Group

NEWSLETTER **October**
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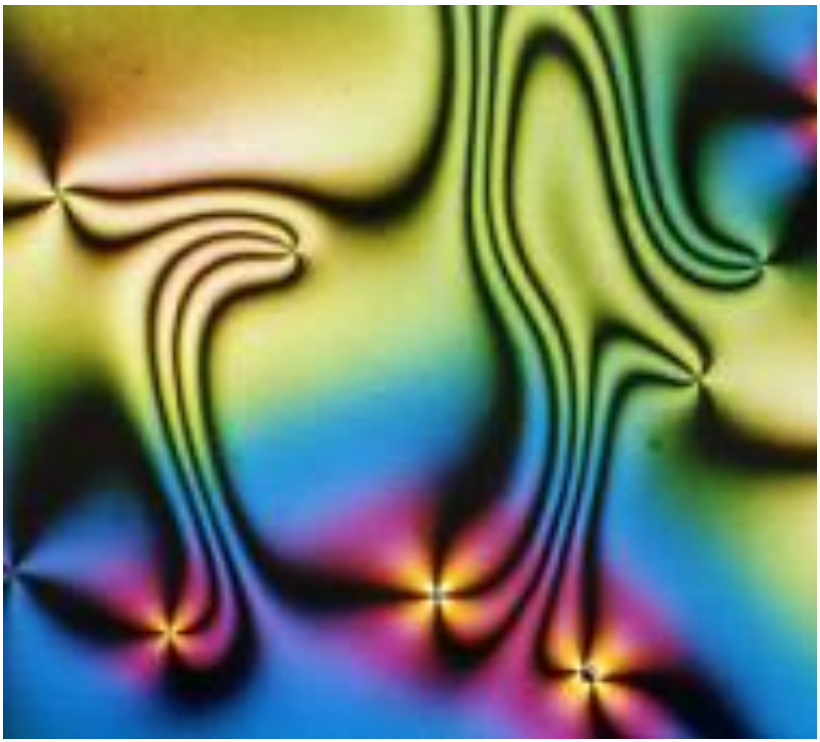

Thin hybrid aligned nematic with boojums. Image courtesy of O.D. Lavrentovich, Kent State University.

See http://www.iop.org/activity/groups/subject/lcf/ for further details

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Hon. Secretary's report

Welcome

The committee of the Liquids and Complex Fluids Group are pleased to welcome you to the 2013 group newsletter. This newsletter outlines the nature of the group, its interests and relevant activities across the country.

2013 Group News

This year has been quite busy for the group. We have again organized the winterschool "Solutions in the Snow", and it was encouraging to see so many graduate students taking part, some for the second or even the third time. The 2013 school was held in Edinburgh; a student report on this event can be found on the following pages.The 2014 school will be held at Homerton College Cambridge, from Friday 11 April to Monday 14 April 2014 (lunchtime to lunchtime). Details will be available on the LCFG website and I hope to see a number of new students, as well as old hands, joining us.

As group secretary, I particularly wish to thank all of those who have given a considerable amount time organising these activities for the benefit of everyone. I would also like to take this opportunity to remind you all that the Committee always welcomes ideas for meetings, workshops and events. The group is able to organise meetings as well as provide sponsorship for meetings planned by external parties, so do please get in touch if you have an idea for an event likely to be of interest to the community. Contact details of committee members can be found at the end of this newsletter.

Please can I remind students of the Research Student Conference Fund, to which all student members of the Group are eligible to apply. Funding of up to £250 is available for eligible students, and applications should reach the Institute by: 1 March, 1 June, 1 September or 1 December.

I would like to draw your attention to the Group's Early Career Prize, which is advertised on page 8 of this newsletter.

The Annual General Meeting of the Group will be held in Cambridge in April 2014. This short meeting is the ideal opportunity for you to comment on the present activities of the group, propose improvements, and make suggestions for future events. I would encourage as many members as possible to attend.

The LCFG committee has undergone a regeneration this year, with Neal Skipper, Stuart Clarke, Bob Evans and Phil Salmon stepping down from committee membership. I would like to thank them all for their hard work since the inception of the group. The committee welcomes Matthew Reeves, Nathasha Rhys, Amparo Galindo, Cesar Mendoza, and Mike Allen, as new members.

Edo Boek, Hon. Secretary,
Liquids and Complex Fluids Group

Reports on recent group events

A report on the 2013 STFC / IoP LCFG Spring School

Matthew Reeves and Natasha Rhys

Student representatives for the IoP Liquids and Complex Fluids Group

The Advanced School in Soft Condensed Matter took place on the 24th-27th March, at Weetwood Hall in Leeds. The school is the seventh of a series that has been run by the IoP Liquids and Complex Fluids Group. This year's proceedings were co-organised by the IoP Polymer Physics Group, and was sponsored by the STFC Centre for Molecular Structure Dynamics, the RSC, and Unilever. 32 enthusiastic PhD students were in attendance.

The school provided training to participants on four topics in soft matter, given by invited speakers. The speakers gave 3 lectures on a specific topic and 1 workshop, to allow students to put into practice what they had learnt. Stimulating sessions this year were given by Dr Daniel Read (University of Leeds) on polymer dynamics, Dr Rebecca Notman (University of Warwick) on simulations of biomolecules, Dr Oscar Ces (Imperial College London) on membranes, and Dr Victoria Garcia-Sakai (ISIS, Rutherford Appleton Laboratory) on neutron spectroscopy. To open the school, a guest lecture was given by Professor Tony Ryan (University of Sheffield), which encouraged students to 'play the

game' and make the most of all the opportunities and connections available in order to succeed in academia. Additionally, the speakers were asked to provide a summary of their career path to date, to show the different routes available to young researchers in soft matter.

Various activities complimented the lectures. The school opened with the 'prop-tastic sandpit', which challenged the students to explain their PhD research using a home-made prop. A research council-like sandpit was then run, where the students were asked to create a project that could receive hypothetical funding. This inspired some very creative ideas; from developing self-healing materials to creating the first '3-course meal' pill. Part way through the event, there was the 'Soft Matter Krypton factor', which tested everyone's skills in team-building, general knowledge, and, naturally, soft matter. In addition, a poster session gave students the opportunity to discuss their work in an informal and friendly environment. This vibrant session proved very successful, overrunning its allocated time significantly. Students were also given the task of providing feedback on selected posters and nominating the best for a prize. The poster prize was sponsored by Unilever. Our congratulations go to Ewan Hemmingway (University of Durham), who was this year's award recipient.

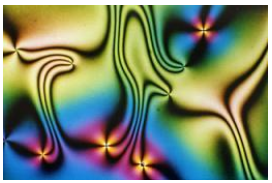
This year's event received very positive feedback from the attendees. The spring school is recognised by those that attend as an invaluable means of broadening their knowledge on a variety of areas in soft matter, and helps to bridge gaps between varying university curricula on what is both a fascinating and diverse field of science. Our thanks goes to Dr Lorna Dougan for organising this year's exceptional spring school and we look forward to being able to attend more like this in the future.

Programmes at the Isaac Newton Institute for Mathematical Sciences

M P Allen and P D Olmsted

In 2013, the Isaac Newton Institute hosted two programmes of interest to LCFG: “The Mathematics of Liquid Crystals” (MLC), running for six months, and “Mathematical Modelling and Analysis of Complex Fluids and Active Media in Evolving Domains” (CFM), for four months.

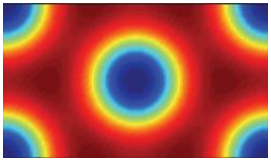
Each programme included about 90 invited participants (with some overlap), many staying for extended periods, and encompassed several workshops addressing specific topics, informal discussion groups, a regular seminar series, and associated summer schools.



Thin hybrid aligned nematic with boojums. Image courtesy of O.D. Lavrentovich, Kent State University

In the MLC programme, a discussion group on “dynamics of bulk nematics in uniform shear flow” tackled the question of the stability of kayaking modes, while other groups looked at “groups, orbits and bifurcations”, and at “density functional theory”.

Tutorial lectures were given by Lech Longa, Jonathan Dawes, Ibrahim Fatkullin, Mikhail Osipov, and others. As an experiment, a remote poster session was organised with scientists at the Liquid Crystal Institute, Kent State University; live video interaction with the presenters was accomplished using Google Hangouts (with some technical support at both ends!). One-week workshops covered topics such as symmetry, bifurcation and order parameters, the link between molecular and continuum descriptions, nonlinear analysis of continuum theories, liquid crystal defects, and active systems. A one-day workshop was held jointly with the British Liquid Crystal Society and the Statistical Mechanics and Thermodynamics Group of the Royal Society of Chemistry, and there was also a two-day “Young Researchers” workshop.



Dewetting structure of a simple liquid. Image courtesy of U. Thiele, Loughborough University

The CFM programme successfully brought together a number of different communities working in soft matter, ranging from biophysics, to mathematics to physics to chemical engineering. This richness was rewarding and stimulating. Scientific themes included active materials, liquid crystals, thin films of simple and complex fluids, lipid bilayers, 2D colloidal matter, biofilms and bacterial swarming, slip and structure near interfaces, growth of epithelial cell layers, thin layers of surfactant laden fluids, among other areas. The general theme of “evolving domains” proved deep and stimulating, encompassing shape changes in 1D (contact lines), 2D (surface

deformations) and 3D (droplet and other shape changes), confinement and its effects on order and structure and lubrication, all with the myriad degrees of freedom presented by complex fluids. Defect dynamics and bifurcations were common recurring themes! Because of the interplay among hydrodynamics, numerous internal degrees of freedom, and shapes, there was much discussion about mathematical aspects of constructing consistent and effective dynamical evolution equations at various length scales, with a particular focus on geometrical formulations of dynamics.

Events included a conference on Active Materials, which had a very constructive overlap with the final workshop of the MLC programme; a two-week summer school on Mathematical Approaches to Complex Fluids; and a Satellite workshop in Leeds. During the programme there were numerous informal discussions and tutorials.

Members of both programmes contributed to the I-CAMP summer school on liquid crystals, attended by over 90 students with an additional 30 participating remotely. There was also a joint "Science Policy Forum" with discussion led by Julian Huppert (MP for Cambridge).

Almost all the seminars in these programmes were webcast (live), and made generally available for download: an invaluable resource for the community at large. Full lists of these recordings, with links to the webcasts, may be found at:

http://www.newton.ac.uk/programmes/MLC/seminars/

http://www.newton.ac.uk/programmes/CFM/seminars/

http://spot.colorado.edu/~smalyukh/icamp2013/ICAMP2013_Program.html

Forthcoming events

Advanced School in Soft Condensed Matter: "Solutions in the Spring"

Organised by the IOP Liquids and Complex Fluids Group with support from STFC, and Biological Physics, and Neutron Scattering Groups

11–14 April 2014, Homerton College, Cambridge, UK

This will be the 8th in our very successful annual series of advanced schools, and will directly precede the conference on The Physics of Soft and Biological Matter at the same venue (see below). Confirmed lecturers include Brent Murray (Leeds) and Silvia McLain (Oxford). Formal announcement and deadlines to follow soon.

The Physics of Soft and Biological Matter

Organised by the IOP Biological Physics, Liquids and Complex Fluids, Molecular Physics, and Polymer Physics Groups
http://softbio.iopconfs.org

14–16 April 2014, Homerton College, Cambridge, UK

This conference will bring together the broad and diverse community interested in the physics of soft and biological matter, which includes liquids, liquid crystals, polymers, colloids, membranes, interfaces, cellular biophysics, and biological macromolecules. The programme will span a number of key cross-cutting themes, including self-assembly and patterning, rheology, biomimetics, non-equilibrium phenomena, as well as molecular imaging, optical methods and spectroscopies, which are all relevant to the wide range of length- and time-scales present in these fascinating systems.

Important deadlines

Abstract submission:	20 Jan 2014
Early registration:	10 Mar 2014
Registration:	4 Apr 2014

Invited presentations:

Capillary-driven flow in thin polymer films - Kari Dalnoki-Veress (McMaster University, Canada)

Scaling laws of polymer membranes: from synthetics to nuclear envelopes and mechanotransduction - Dennis Discher (University of Pennsylvania, USA)

Hydrodynamics and phase behaviour of active suspensions - Suzanne Fielding (Durham University, UK)

Single molecule studies of protein aggregation - David Klenerman (University of Cambridge, UK)

Self-assembly of patchy colloids David Pine (New York University, USA)

Particles at complex interfaces Kathleen Stebe (University of Pennsylvania, USA)

Also of interest to Group Members:

International Soft Matter Conference
16th-19th September, 2013
Rome, Italy.

This conference will bring together scientists interested in soft matter systems such as polymers, colloids, surfactants, membranes, biomaterials and their composites.

BIOLOGICAL SOFT MATTER
Amos Maritan (Università di Padova, Italy)
Dennis Discher (University of Pennsylvania, USA)
Jean-François Joanny (Institut Curie Paris, France)
Felix Ritort (Universitat de Barcelona, Spain)
G.V. Shivashankar (National University of Singapore, Singapore)

COLLOIDS
Clemens Bechinger (Universität Stuttgart, Germany)
Frank Cichos (Universität Leipzig Germany)
Willem Kegel (Universiteit Utrecht, The Netherlands)
Yan Levin (UFRGS Porto Alegre Brazil)
Veronique Trappe (University of Fribourg, Switzerland)

DYNAMICS OF COMPLEX FLUIDS

Julia Yeomans (University of Oxford, UK)
Lydéric Bocquet (Université Lyon 1, France)
Roberto Di Leonardo (CNR-IPCF, Italy)
Gerald Fuller (Stanford University, USA)
Davide Marenduzzo (University of Edinburgh, UK)

MEMBRANES
Gerhard Gompper (Forschungszentrum Juelich GmbH, Germany)
Pietro Cicuta (University of Cambridge)
Emma Sparr (Lund University, Sweden)

POLYMERS
Michael Rubinstein (The University of North Carolina at Chapel Hill, USA)
Joerg Baschnagel (Université de Strasbourg, France)
Jian Ping Gong (Hokkaido University, Japan)
Tim Lodge (University of Minnesota, USA)

SELF-ASSEMBLY
Daan Frenkel (University of Cambridge, UK)
Mirjam Leunissen (FOM Institute AMOLF, The Netherlands)
Andrew Turberfield (University of Oxford)
José Maria Tavares (ISEL and CFTC, Lisboa, Portugal)

SURFACES AND INTERFACES
Jacob Klein (Weizmann Institute of Science, Israel)
Dirk Aarts (University of Oxford, UK) (CV)
Ashutosh Sharma (Indian Institute of Technology, Kanpur, India)
Kathleen J. Stebe (University of Pennsylvania, USA) (CV)

SOFT NANOTECHNOLOGY
Dan Luo (Cornell University, USA)
Paul Clegg (University of Edinburgh, UK)
Roland Netz (Technische Universität München, Germany)

http://www.ismc2013.it/

9th Liquid Matter Conference
21-25 July 2014
Lisbon, Portugal

http://www.fc.ul.pt/en/conferencia/liquids-2014

This conference will bring together scientists interested in liquid matter. Invited and plenary speakers include

M. Bonn (Max-Planck-Institute for Polymer Research, Mainz, Germany)
Z. Dogic (Brandeis U., USA)
L. Leibler (ESPCI Paris, France)
F. Sciortino (U. Roma "La Sapienza", Italy)
O. Gang (Brookhaven National Laboratory, USA)
S. Herminghaus (Max-Planck-Institute for Dynamics and Self-Organisation, Göttingen, Germany)
L. Berthier (U. Montpellier 2, France)
H. A. Stone (Harvard U., USA)
J. Yeomans (U. Oxford, UK)
M. Dogterom (FOM Institute AMOLF. The Netherlands)

1. **Ionic Liquids and Liquid Metals**
- J. N. Canongia Lopes (Tech U. Lisbon, Portugal)
- E. Maginn (U. Notre Dame, USA)
- R. Podgornik (U. Ljubljana, Slovenia)

2. Water and Solutions
- R. van Roij (U. Utrecht, Netherlands)
- C. Valeriani (U. Compl Madrid, Spain)

3. Liquid Crystals
- R. Mezzenga (ETH Zürich) Switzerland)
- S. Žumer (U. Ljubljana, Slovenia)

4. Polymers, Electrolytes, Biopolymers
- R. Everaers (ENS Lyon, France)
- M. Müller (U. Göttingen, Germany)

5. Colloids
- V. Manoharan (Harvard U., USA)
- G. Maret (U. Konstanz, Germany)
- P. Schall (U. Amsterdam)
- E. Trizac (U. Paris Sud, France)

6. Films, Foams, Surfactants, Emulsions

- J. Bibette (ESPCI Paris, France)
- M. Dennin (U. California, Irvine, USA)
- W. Drenckhan (U. Paris Sud, France)

7. Confined Fluids, Interfacial Phenomena

- H. -J. Butt (MPI for Polymer Research, Mainz, Germany)
- A. Yodh (U. Pennsylvania, USA)

8. Supercooled Liquids, Glasses and Gels

- G. Biroli (CEA Saclay, France)
- M. Ediger (U. Wisconsin, USA)
- M. van Hecke (U. Leiden)

9. Driven Systems, Rheology and Nanofluidics

- E. Kumacheva (U. Toronto, Canada)
- P. Sollich (King's College London)

10. Active Matter

- L. Bocquet (U. Lyon 1, France)
- E. Lauga (U. California, San Diego, USA)

11. Biological and Biomimetic Fluids

- F. Jülicher (MPI Physics of Complex Systems, Dresden, Germany)
- D. Needleman (Harvard U., USA)

Group Prize:

Liquids and Complex Fluids Early Career Award

The group awards a biennial prize to an exceptional scientist in the early stage of their career, working in the broadly defined area of Liquids and Complex Fluids. This year, the committee has decided to extend the deadline for nominations to 31 October 2013, and to extend the definition of "Early Career" to include individuals with no more than ten years postdoctoral experience (allowing for career breaks) following the award of a PhD. Those eligible for IoP awards should be members of the Institute. For more information, please see the group website at

http://www.iop.org/activity/groups/subject/lcf/index.html

As chair of the Liquids and Complex Fluids group, I encourage everyone to consider suitable nominees for this award. It is a great opportunity to raise the profile of the individual's research, and the area of liquids and complex fluids in general. The group usually arranges a meeting, or a session within a larger meeting, at which the award winner is invited to present their recent results. Previous winners were James Adams (University of Surrey) and Dirk Aarts (University of Oxford).

Mike Allen

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Members of the committee welcome suggestions and comments from group members to help facilitate the running and development of the group at any time.

What is the Liquids and Complex Fluids Group?

The Liquids and Complex Fluids Group aims to advance research into the liquid state of matter, complex fluids, and soft condensed matter by fostering collaborations between experimentalists, theorists and computer simulators working in these fields. Its scope encompasses both structure and dynamics from microscopic to mesoscopic and macroscopic length scales in systems ranging from simple liquids to all kinds of complex fluids and soft materials such as polymers, emulsions, gels, foams, colloids, liquid crystals, and their biological counterparts. The group correspondingly enjoys close links with the Polymer Physics and Biological Physics Groups of the IoP. Other topics covered include liquid mixtures and solvation phenomena, liquids and glasses under extreme conditions, confined liquids and fluids at interfaces, the glass transition and arrested states of matter (including the structure of glasses and amorphous solids), crystal growth in liquids, and self-assembly from solution.

This highly interdisciplinary field has industrial links to the pharmaceutical, petroleum and plastics, food and personal care industries, among others. The physical realisation of many ideal model systems is of interest to physicists interested in statistical mechanics, liquids, elasticity, flow behaviour and rheology, and non-equilibrium phenomena. Nevertheless, liquids and complex fluids are topics that are poorly covered in the traditional undergraduate curriculum so a distinctive aim of the group is postgraduate education, for example, via graduate schools aimed at the exposition of basic ideas that cut across the sub-disciplines of the field. Another aim is the development of new instrumentation for work on liquids and complex fluids at UK supported X-ray and neutron sources together with sophisticated data interpretation tools. The Group therefore benefits from interactions with the Neutron Scattering Group where appropriate. Collaboration with other liquid matter researchers is strengthened through links with the Faraday Division of the Royal Society of Chemistry (the interests of many physical and theoretical chemists encompass the topics covered by our group) and through co-operation with the Liquids Board of the European Physical Society.

This newsletter is also available on the web and in larger print sizes

The contents of this newsletter do not necessarily represent the views or policies of the Institute of Physics, except where explicitly stated.

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