Welcome to the world of "Fluid Foam Physics: A Model For Complex Systems"

9th - 20th January 2006

WELCOME TO THE END OF THE WORLD – But the beginning of a great school !!!

Outline

- ORGANISATION of the School 10 min
- **PEOPLE** of the School 10 min
- SCIENCE of the School 20 min
- Introduction to the Tutorials (by Florence) 10 min
- Organisational PS (or the "unwritten rules of the game" and ... by Francois) 10 min

ORGANISATION

EVERYTHING WHICH HAS BEEN WRITTEN WAS WRONG: (Names of people, time table, schedule, teachers...)

Things will keep changing as we adjust and optimise with YOUR HELP.

i.e. keep looking at the NOTICE BOARD as often as possible and TALK TO US – or the secretaries of the school!

GENERAL PROGRAM

	Mon 9	Tue 10	Wed 11	Thu 12	Fri 13	Sat 14	Sun 15	Mon 16	Tue 17	Wed 18	Thu 19	Fri 20
7.45			Breakfast									
8.45 - 9.45 9.50 - 10.50 11.15 - 12.15		Lectures										
12.30 - 13.30			Lunch									
14.00 - 17.00		Afternoon programs/ spare time										
17.00 - 18.00		Demonstrations/ Tutorials						Demonstrations/ Tutorials				
18.15 - 19.15		Participants' presentations						Participants' presentations				
19.30 - 20.30 bar – 21.00		Dinner										
21.00 -		Various Evening programs / spare time										

Chairpersons & Bubbles

ADDITIONAL PROGRAM

		Tue	Wed	Thu	Fr	Sa	Su	Мо	Tue	Wed	Thu	Fr
		10	12	13	14	15	16	17	18	19	20	21
BREAKFAST	starts at 7.45											
	8.45-9.45											
MORNING	9.50-10.50											
	break	lectures	lectures	lectures	lectures	lectures		lectures	lectures	lectures	lectures	lectures
	11.15 - 12.15											
LUNCH												
EARLY AFTERNOON		chocolate		giant soap film				informal Miguel				
		mousse										
LATE AFTERNOON	17.00-18.00	tutorials	tutorials	tutorials	turorials	firemen?	scientific café	tutorials	tutorials	tutorials	tutorials	
				giant soap film			chamonix ??					
EVENING	18.15-19.15	presentations	presentations	presentations	presentations	discussion		presentations	presentations	presentations		
				giant soap film		with beer brewers						
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DINNER	19.30-20.00											
				D 1 01		D4077/	0.1					
AFTER DIINER	after 9 pm	WELCOME	Physics & Industry	Popular Science		PARTY	Scientific Discovery			Physics & Arts?		
		PARTY	Andre	exchange			Miguel			(Wiebke&Francois)		
			TAIKADISCUSSION									

Announcements at the beginning of every first lecture.

TODAY

		Tuesday 10th
BREAKFAST	starts at 8 (7.45)	
	8.45-9.45	
MORNING	9.50-10.50	
	break	lectures
	11.15 - 12.15	
LUNCH	12.30 – 13.30	
EARLY AFTERNOON		chocolate mousse !!!
LATE AFTERNOON	17.00-18.00	tutorials
	18.00-19.00	
EVENING	(18.15-19.15)	presentations
	19.00-19.30	Welcome Drink
DINNER	19.30-20.00	dinner
AFTER DIINER	after 9 pm	

ИS



THE ORGANISERS (& teachers)



FRANCOIS GRANER

Spectrométrie Physique Grenoble France



FLORENCE ELIAS

Matière et Systèmes Complexes Univeriste Paris 6/7 France



WIEBKE DRENCKHAN

Foam Physics Group Trinity College Dublin Ireland

PROGRAM

TUTORIALS

PARTICIPANTS



ANDREW BELMONTE

Department of Mathematics Pennsylvania State University USA

- Mechanical and Hydrodynamic instabilities
- Pattern formation
- Non-linear dynamics
- Mathematical Physics



SILVIE COHEN-ADDAD

Jan 12-19

Jan 11-20

Laboratoire Physique des Matériaux Divisés et des Interfaces Université de Marne-la-Vallée, France

- Liquid foams: structure, ageing, rheology
- Froth flotation
- Multiple light scattering.
- Diffusing-wave spectroscopy



SIMON J. COX

Institute of Mathematical and Physical SciencesUniversity of Wales Aberystwyth UK

- Structure, drainage and rheology of foams and cellular materials
- Minimal Surfaces

RITA MARIA CUNHA DE ALMEIDA Jan 9-20

Universidade Federal do Rio Grande do Sul -Av.Bento Gonçalves 9500

Porto Alegre

Brazil

- Complex systems, simulations and theory.
- Biologically motivated problems: theory, simulations and experiments.
- Diffusion related problems: theory and simulations. Application to Oxygen reaction and diffusion in Si.





NIKOLAI DENKOV

Jan 9-15

Laboratory of Chemical Physics & Engineering Faculty of Chemistry, Sofia University, Bulgaria

- Surface forces and Stability of thin films (colloidal structure forces, stratification)
- Foam generation, rheology, and stability;
- Antifoam effect; Formation and Stability of Emulsions; Colloid crystals;
- Mechanisms of detergency;
- Experimental methods in colloid and interface science



ANDRE MOREIRA BASF AG Ludwigshafen Germany

- Foam formation,
- Nucleation in polymer foams,
- Adhesion of polymers,
- Interactions in ionic fluids

Jan 9-14



ARNAUD SAINT-JALMES

Laboratoire de Physique des Solides Université Paris-Sud Paris

- Soft matter and physics-biology interfaces
- Structure and dynamics of liquid interfaces and thin liquid films, foams and emulsions

YOU !

Jan 9-20

SCIENCE of the school

Introduce some basic concepts & an outline of the general subject & the outline of the school

GOOD LUCK! Francois get the bubbles ready!!!







WHY STUDY FOAMS?



2. Foams are fun







Love Parade, Berlin



Manet

Foam Party











2. Foams are useful

and we are surrounded by them











3. Foams teach us about related systems Spacetime Foam Rita the immediate era after the Planck tin so high that spacetime itself is folded holes and wormholes **Andrew** mushroom sponge although the Planck time marks the beginning of time in the Universe, the and overlaping event horizons, makes it impossible for matter, photons or even causality to exist sunflower pine cone Quantum foams honey comb Arrangement of matter in the universe plant cells Giants Causeway, Ireland





What is a foam?



By Dublin artist D. Boran

Interesting and important physics (and chemisry...) on all scales





Disjoining pressure

- Common black film
- Newton black film







Plateau's Wireframe Experiments – Plateau's Rules







Rules of equilibrium



Plateau (1873):

three-fold vertices making angles of 120°







Computer simulations



Minimisation of interfacial energy





Dry 2D foam



Wet 2D foam ("bubbly liquid")

LIQUID FRACTION Φ = liquid volume / gas volume

PATTERN FORMATION





plant cells



(by Piotr Pieranski)



mushroom sponge







Rules of equilibrium:

Plateau (1873):

four-fold vertices meet at angles of **109.6**°



Laplace:

curvature *c* of the films and interfaces is determined by the pressure jump across them

$$\Delta \boldsymbol{p} = \boldsymbol{2} \boldsymbol{\gamma} (\boldsymbol{c}_1 + \boldsymbol{c}_2)$$







Arnaud

Koehler, Hilgenfeldt, Weeks and Stone Phys. Rev. E **66**, 040601(R) (2002)





Scaling laws etc... This is why you have to drink your beer quickly!



Topological Changes



after **T2**

I

T1-process

(Neighbour-switching of bubbles)







Downward lift





Fluid Foam Physics

Example: Drainage and Rheology

Surfactant solution





"Convective Instability"



In this process ...

YOU ARE THE FUTURE!!!

And we hope to be able to help you in this process!



HAVE A WONDERFUL SCHOOL – in all respects !!!