

EMBO PRACTICAL COURSE
 October 25 – November 1, 2010 EMBL Hamburg, Germany

SOLUTION SCATTERING FROM BIOLOGICAL MACROMOLECULES

The course aims at young biochemists/biophysicists and researchers active in related structural methods with little or no experience in solution scattering. The course will cover basics of SAXS and SANS, instrumentation, data collection, modelling techniques and complementary use with other methods. The students will be encouraged to bring their own samples to perform synchrotron solution scattering experiments on-site and the results will be used for practical tutorials and discussed on the last day of the course. There is no registration fee. Accommodation and subsistence are covered for accepted applicants. Scientists from industry will be required to pay a fee of €1000. Limited travel support available. Registration deadline: July 31, 2010 -- www.embl-hamburg.de/training/courses_conferences/course/2010/SAXS/

Welcome!

20 full participants and
 6 lecture attendants
 (20 nationalities
 representing institutes
 from 18 countries)

7 local Hamburg
 attendants (for
 lectures/tutorials only)

EMBL Outstation at DESY, Hamburg

1974

EMBL-Paradise

36 years later

EMBL life sciences center
 at upgraded Petra-3 ring
 (construction started 2.07.2007 – you will see the progress today)

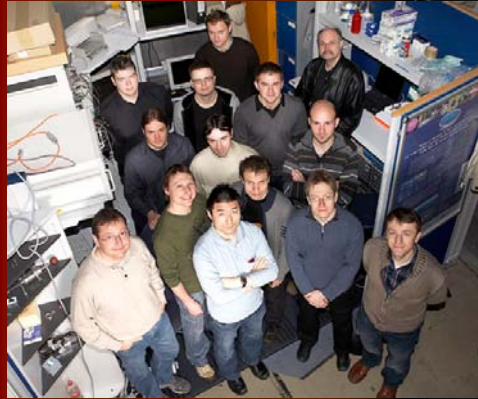
2 MX beamlines
 1 BioSAXS beamline



Biological SAXS @ EMBL-HH



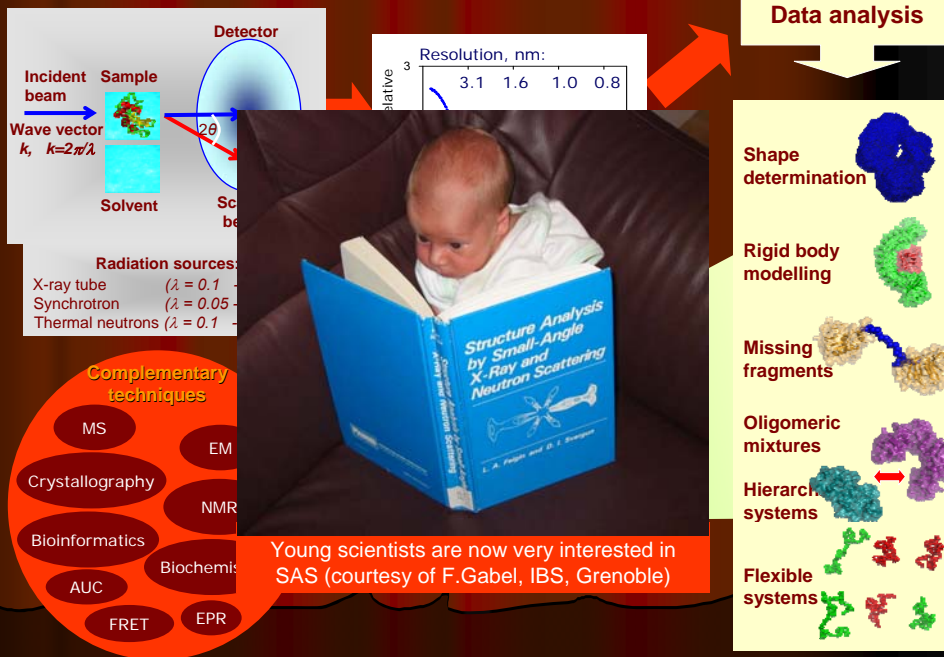
Group leader: D. Svergun
 Staff scientist: M. Petoukhov
 Petra-3 project leader: M. Roessle
 Staff with joint appointments:
 P. Konarev, D. Franke
 Postdocs: H. Mertens, W. Shang,
 M. Gajda, C. Gorba, C. Blanchet
 Predocs: A. Kikhney, A. Shkumatov,
 G. Tria, I. Danciu



Major tasks

- ❑ Running the X33 beamline
- ❑ User support and collaborative projects
- ❑ Development of data analysis methods
- ❑ Design and construction of the BioSAXS @ Petra-3 (in collaboration with the EMBL Petra-3 team)
- ❑ Education and training (including regular courses)

Small-angle scattering in structural biology



All new is well forgotten old

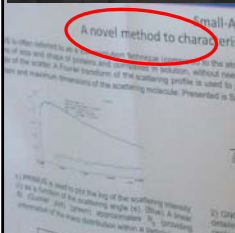


On finishing my university studies, in 1936, I obtained a post as assistant, which gave me the opportunity to work towards my thesis...

My "boss", who looked after my dissertation, ... was a crystallographer who kept an eye on my work rather distantly, but he did pass on a very good idea on me: to study, in addition to Bragg diffractions, diffuse scattering.

<He> asked me to make a camera with monochromatic primary radiation and with minimum parasitic radiation... That is why I studied especially small-angle scattering. I observed that ... the scattering is strong when the sample contains fine grains (10 to 100 nm).

I produced next the means of determining the grain size from the scattering curve. It was the beginning of X-rays small-angle scattering...



Guinier, A. (1939). "La diffraction des rayons X aux tres petits angles; application a l'etude de phenomenes ultramicroscopiques." Ann. Phys. (Paris) 12: 161-237.

When biologists go for SAS



Care for a shape?

This is just a trivial case:
You will learn that
SAXSMAN (© A.Kikhney)
yields much, much more



Schedule of the Course



- Day 1 : Basics of small-angle scattering (Mon 25 Oct)
- Day 2 : Data processing (Tue 26 Oct)
- Day 3 : *Ab initio* methods (Wed 27 Oct)
- Day 4 : Rigid body refinement (Thu 28 Oct)
- Day 5 : Mixtures and interacting systems (Fri 29 Oct)
- Day 6 : Applications and related methods (Sat 30 Oct)
- Day 7 : Future outlook, general discussion (Sun 31 Oct)
- Day 8 : General discussion, Departure (Mon 1 Nov)

Lectures and Practicals

- ***Theory Seminars*** (HASYLAB Seminar Room 109)
- ***Software Demonstrations/Tutorials*** (HASYLAB Seminar Room, PC, LCD projector)
- ***Structural Biology Seminars*** (HASYLAB Seminar Room)
- ***Measurements of test samples*** (SAXS X33 beamline, HASYLAB-3 experimental hall). Shutter permission and HASYLAB safety instructions are required.
- ***Free Practicals and Data Analysis*** (EMBL Seminar Room, 7 PC's and Library, 3 PC's)

The major threat for a Course



People are able to sleep at nearly any circumstances

SAXS Play Station IV (anti-sleeping pills)

- SAXS Bingo © M.Petoukhov

- SAXS Quest



Whom to ask

- **General questions:**
 - Dmitri Svergun (internal 125, mobile *127), Alexey Kikhney (170)
- **Organizational questions:**
 - Margret Fischer (internal 110, mobile 0175 4105 760)
 - Ivanka Araujo (183), EMBL secretary
- **Computer hardware:**
 - Daniel Franke (244)
- **Computer software:**
 - Maxim Petoukhov (177), Peter Konarev (224), Christian Gorba (113), Alexander Shkumatov (170)
- **SAXS measurements:** Manfred Roessle (192), Clement Blanchet (*150), Weifeng Shang (232)
- **Wetlab, samples:**
 - Haydyn Mertens (113), Michal Gajda (228)



Miscellaneous

- **Course photo:** October, 29th, lunch break
- **Sequence of measurements:** A list will be made by Manfred
- **Pairing for the Quest:**
 - A list will be compiled by Maxim
 - Quest run starts tomorrow
- **USB sticks:**
 - Contain at present ATSAS 2.3 distributive (for non-commercial participants)
 - Can be used to download Course materials from a Web repository
- **Own laptops:** In Room 109, DESY Guest network, in EMBL rooms, network 'passat' (MAC address must be registered, approach our computer group)
- **Your samples:**
 - You are responsible for them yourself-- ask Haydyn for help
 - Minimize the use of the Wetlab, most facilities are available at the beamline!
- **Your presentations:**
 - 26 participants, (with or without PPT, as you wish)
 - A total of 10 minutes per participant (7 min talk + 3 min questions)