Report of LARMOR Kick-off meeting

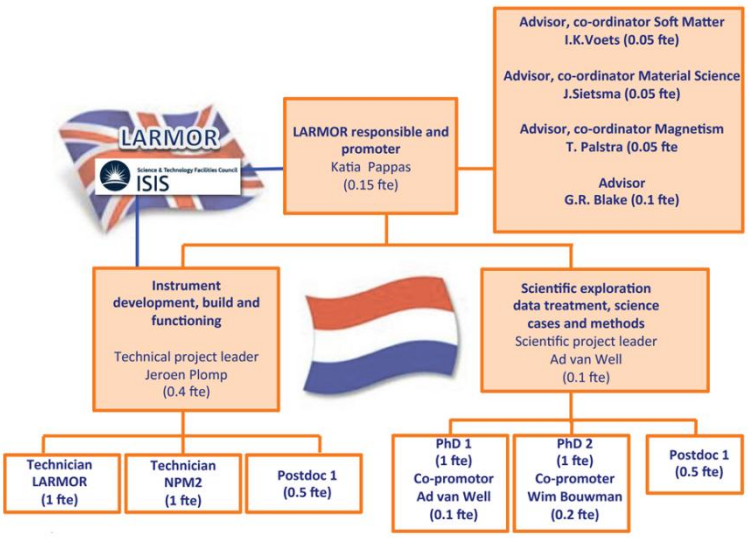
Utrecht, 2nd October 2012 (by J.Plomp)

Present: Lambert van Eijck *(TUDeflt, diffraction)*, Katia Pappas *(TUDelft, LARMOR Delft project leader)*, Rob Dalgliesh *(ISIS UK, LARMOR ISIS project leader)*, Fokko Mulder (*TUDelft, Energy storage*), Jeroen Plomp (*TUDelft, technical project leader*), Hessel Castricum (*UvA, membrane/gas*), Wim Bouwman (TUDelft, *co-promoter LARMOR PhD*), Ilja Voets (*TU Eindhoven, LARMOR soft matter coordinator*), Thom Palstra (*University of Groningen, LARMOR magnetism coordinator*), Graeme Blake (*University of Groningen, LARMOR magnetism advisor*), Martin Feiters (*University of Nijmegen, x-ray/neutron soft matter*), John van Duynhoven (*Unilever, structures*), Niels van Bakel (*Amsterdam Scientific Instruments, detector development*), Josef Uher (*ASI, detector development*), Dmitry Byelov (*ASI, detector development*), Sean Langridge (*ISIS UK, division head*), Hans Tromp (*NIZO/Utrecht, food*), Ad van Well (*TUDelft, co-promoter LARMOR PhD*), Andrei Petukhov (*University of Utrecht*), Ekkes Brück (*TUDelft, magnetism*), Jilt Sietsma (*TUDeflt, material science*), Niels van Dijk (*TUDelft, magnetism/materials*), Bert Wolterbeek (*TUDelft, Director RID/head RST*)

Agenda:
13:00-14:00 : buffet lunch
14:00-14:05 : Welcome
14:05-14:30 : Katia Pappas: the present state of LARMOR@TU Delft
14:30-15:00 : Robert Dalgliesh: LARMOR@ISIS
15:00-15:30 : Jeroen Plomp: LARMOR the technical part.
15:30-15:45 : coffee break
15:45 -16:15 : Ilja Voets: Soft Matter
16:15 -16:45: Graeme Blake: Magnetism
16:45 -17:15: Jilt Sietsma: Materials
17:15 -18:00 : wrap up/borrel

Presentation of Katia Pappas:

- Meeting is to trigger discussion about needs for the LARMOR instrument.
- There are three proposing universities; Groningen, Eindhoven en Delft. Preferably the PhD students will be originating from Groningen and Eindhoven to take part in the scientific program.
- The organization of the project is as follows:



- This means we are looking for two PhD students (one will start in 2013 and the other in 2014), one postdoc, one technician (start mid 2013).
- ISIS will provide a top class SANS instrument where Delft will provide in spin-echo components.
- All modes of LARMOR are discussed in short.
- Change of timeline so now available measuring time, SANS and probably SESANS, available from start 2015.
- The budget will be stretched over 6 years after granting because finding the right people will cost time.
- Other relevant projects for neutrons in the Netherlands are the Oyster project where the Delft Reactor was granted 38 Meuros for an reactor upgrade, running costs for 10 years and instrumental upgrade and build of new instruments like a SANS and neutron diffractometer (Pearl) to serve the Dutch neutron community. Another project is the European Spallation Source (ESS) that was not put on the roadmap but the Netherlands is still a member and has a small budget to collaborate, with two postdocs, in new developments.

Presentation of Rob Dalgliesh:

- An overview of the instrument is given and the large scale of the project is emphasized including big bio lab facilities.
- The project is already running over three years and is close to the installation phase.
- Wavelengths that will be available are from 0.5 to 13 Angstrom and a solid state or He3 polarizer will be used depending on the application.
- Sample stack and guides will be delivered any time.
- If you want any special liquids or gas at the sample position let us know within 6 months.
- The science case is very important to explore all possibilities of the instrument.
- Flux could be in the order of 10x more than OffSpec with minimal sensible beam size for sans of 2x2 mm.
- Open question; what will be the balance between SANS/SESANS/Larmor diffraction/TOFLAR/etc.
- Sample environment is extremely important for success of instrument, please tell us what you need (this triggers a discussion about sample environment) on day 1 and within 4 years from now.
- Initiative for sample environment inventory is taken up by ISIS (Sean Langridge) and more will follow on this topic.

Presentation of Jeroen Plomp:

- Explains all the different modes and discusses the technical implications.
- The big question is what techniques do we want to combine with SANS.
- There are possibilities to combine SESANS with SANS at the same time to look into nm and micrometre length scales at the same time but this has technical implications (there seems not to be much interest in this combination).
- Amsterdam Scientific Instruments is in the project for high resolution neutron detector development.
- Another question is do we still want to go to large length scales for SESANS so to 30 micron or are we happy with 5 micron, the clear opinion was that 30 micron is needed.
- Can be interesting to have a classical (or LARMOR) diffraction option (extra detector) to combine this with SANS which can be interesting for material science (positive reactions).

The science case of what is expected from LARMOR is discussed is the following section

Presentation of Ilia Voets:

- Neutrons at LARMOR can be used for structure determination, thermodynamic quantities, interactions and dynamics.
- We can think of colloids, complex molecules, or food matter.
- From experience neutrons were used to look at folding of polymers.
- For sample environment one should agree on sample size, temperature range for sample rack, pressure and humidity control and even shear. These are demands that are not outside the technical scope of the project.
- Access to the instrument should be via a transparent system, how will this work? (The number of days per experiment will also depend on the technique).
- Help with data reduction and analysis after experiment is as important as technical support before, during and after the experiment. Extremely important for new users!

Presentation of Graeme Blake:

- Main interest in LARMOR Diffraction mode of LARMOR and polarised SANS.
- Interest in magnetically induced structural domains and nano-crystallites in magnetic materials.
- Also interested in magnetic SESANS for large-scale structural modulations.
- Magnetically induced atomic displacements of 50 fm/T is hopefully in the reach of LARMOR.
- Topic of thin films, piezoelectrics, magnetic alkali superoxide's, thermoelectric materials and giant magnetocaloric materials are in the field of interest.
- Sample environment that can go as low as 4 K and up to 1273 K and possible cyropad (cryopad was discouraged by Katia).
- Probably need one week of beam time for one experiment.

Presentation of Jilt Sietsma:

- Interested in the Larmor diffraction mode with the 10^{-6} resolution.
- Interested in polarised SANS for the length scale of 1 to 100 nm.
- Interested in SESANS for the 30 nm to 30 micron length scale.
- One should think about materials for energy storage, self-healing, membranes or composites.
- Sample environment should even go above 1000 ˚C with mechanical loading.
- Time dependent measurements needed within minutes range.

Concluding remarks:

- Thom Palstra: Important to have a unique high impact experiment (Larmor diffraction).
- Katia Pappas: Sample environment seems to be very important and we (ISIS) need input on that.
- Ilia Voets: Data fitting online, during experiment is very important so also invest in that part.
- Katia Pappas: We need to find good PhD's preferably originating from Groningen and Eindhoven, we should start putting profiles together.

- Katia Pappas: SANS at the same time as SESANS is not a high priority option. It is important to go to 30 micron for SESANS.
- Katia Pappas: Can be important to have another detector for diffraction that can be combined with SANS (or others) for material science. This needs more investigation on the technical side.
- Information can should become available on the weblog and if there are any questions or remarks please let us know.
- Presentations of the meeting will be put on the weblog.