

Scientific Report
COST Summer school on Spin-Hyperpolarization
Leiden, 29 Oct. - 2 Nov. 2012

The summer school brought PhD students and young postdocs together with scientist with specific expertise in the different subfields of spin-hyperpolarization in magnetic resonance. Together we aimed to explore these hitherto largely separate areas and the overlap between them. The aim was to enable a new generation of young researchers in the spin-hyperpolarization to learn the specific problems and solutions in the various different approaches to create hyperpolarized nuclear spin systems. Such transfer of knowledge, as it turned out, is possible in various aspects such as relaxation control and analysis, polarization transfer, theoretical modeling and hardware development.

About 20 scientists and 5 teachers attended. There were 13 teaching lessons, student presentations on existing literature on various aspects of hyperpolarization, two poster sessions with the students presenting their own research, guided discussions and time for private communication. Also the common social events allowed for personal and scientific exchange.

In the application, we stated that the workshop will be a success when

- (i) the basics of the field are transferred to a new generation of scientists,
- (ii) the current discussions in the field are presented allowing the new generation of early state researchers to identify their own area of active research,
- (iii) contacts among young researchers as well as between young and experienced researchers are established,
- (iv) the COST education programme gets running and establishes a basic set of literature.

We can safely state that all four aims have been reached fully or at least to a high degree. The educational programme of the COST Network on spin-hyperpolarization (EuroHyperPol) obtained a jump-start, the teachers were well prepared and kept a high scientific and educational level, all students were always present and highly motivated, a number of new contacts were established and, last not least, the atmosphere was over the entire week friendly and open. The community is looking forward to the next summer school in this area of research.

Science:

1. [A concise version of the description and aims of the workshop.](#) Nuclear Magnetic Resonance (NMR) spectroscopy and imaging techniques (MRI) are well known and versatile analytical methods. The key issue is frequently sensitivity limiting the applicability. To overcome this problem, various hyperpolarization methods have been developed. Within a new 4-year COST action we bring for the first time together PhD students and young postdocs working on those different approaches to stimulate exchange between research communities and to grow a new generation of scientist able to oversee the entire field.

2. [Is a tangible outcome of the workshop expected?](#) Existence of a waiting list of almost 10 people who intended to come but could not do so because of the limited capacity of the Lorentz-Center confirms that organizing a new type of summer schools on this subject was a right decision. The summer school provided sufficient overview of what is done in the field, what strategies and methods are advantageous, what are the current scientific problems and strategies for their solution. The oral contributions by teachers and students triggered lively discussions, in both, the seminar room as well as in the other areas of the Snellius Center. The summer school was the first one within the COST network and the Snellius environment provided a wonderful infrastructure. We expect that the new generation in hyperpolarization will be able to use knowledge from all different fields.

3. Where there any developments which could, already, be termed a (beginning) scientific breakthrough?

It was clearly a teaching event but we feel that the interconnection of the different fields in hyperpolarization has the potential to lead to scientific breakthroughs. It is necessary to educate a new generation of scientist who can move beyond the borders of their own subfield to come up with a generic solution to nuclear hyperlozarization which would revolutionalize the field of magnetic resonance.

4. Did you, or to your knowledge any of the participants, experience notable "Aha" moments? Yes, thanks to excellent teachers and highly motivated students, many presentations lead to new insights. Sometimes it was of the participants obtained new knowledge, sometimes new intellectual connections were made.

Organization/Format:

5. How did you experience the format of the workshop? Did you try something new? Would you do it again or advise it to others? The advice of the Lorentz Center was very helpful. In particular we were suggested to give more room for free discussions and for involvement of younger scientists. Both worked out very well. The workshop offered an optimal combination of teaching lessons, poster presentations, discussion rounds and presentations of young scientists. There was also enough time for informal discussions that were very helpful for establishing new contacts and efficient exchange of ideas.

6. Other comments. We are very grateful to the staff of the Lorentz-Center for their expert handling of all administrative matters. The workshop was a joy to organise with such friendly and professional assistance. The meeting would not have been possible without the Center's generous financial support for which we are most grateful. We are sure that all the participants enjoyed the infrastructure of the Snellius-Center that is optimal for a such small meetings. It was particularly convenient that each participant had an office space and internet password. The cultural program was also perfectly organized. The only small point of criticism was that participants had difficulties to find the Snellius-Center at the first day.

Arno Kentgens (Nijmegen)
Jörg Matysik (Leiden)