

SCIENTIFIC COOPERATION

Interview with Christian MINIATURA, Research Director at the CNRS



Director of Research at the CNRS, Christian Miniatura is the head of MajuLab, a joint Franco-Singaporean Mixed International Unit research laboratory. He is a Visiting Professor at the Centre for Quantum Technologies (CQT) of the National University of Singapore (NUS) and at the School of Physical and Mathematical Sciences (SPMS) of the Nanyang Technological University (NTU). He tells us about quantum physics, the formidable research rise in Singapore, and the success of the Merlion programme : a key element for the initiation of scientific collaborations.

You came to Singapore for the first time in 2003. What is your view on the evolution of research in the city-state these last 10 years?

Christian Miniatura – Research in Singapore has experienced a formidable rise these last 10 years. Indeed, even if the government got interested in R&D in the 90s to spearhead an economic turning point (to move from manufacturing products to innovation, notably in the pharmaceutical and ICT sectors), and created a public institution for research[1], Singapore still did not count in world class research area at the beginning of the 2000s. Then, thanks to a strong governmental will, outstanding responsiveness and colossal financial resources, Singapore was able to provide a supportive environment for academic and industrial researchers, and to attract international talents and investors. The major step was the creation of the Research Centres of Excellence (RCEs) in 2007[2], which truly marked a turning point towards scientific research of the highest level.

On the other hand, the 2000s also corresponded to a turning point towards the “knowledge economy” in France and Europe. Public authorities are starting to work more and more on research internationalization; on one hand to reinforce France’s attractiveness to foreign researchers and on another hand to develop cooperation to counter scientific brain drain from competitive foreign policy on both talents and knowledge. Thus, since the last decade scientific cooperation has strongly risen between Singapore and France, and also with other countries.

Today Singapore may not be indispensable, especially since the country remains very focused on certain key sectors and on applied research with a quick return of investment, more than on fundamental research; however, Singapore certainly occupies a prominent place on the world map of scientific research.

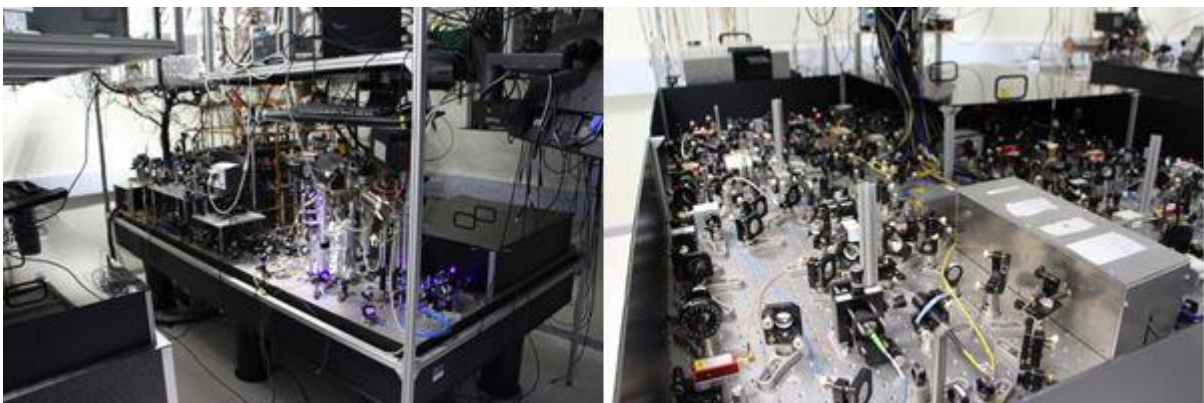
What is your research background in Singapore?

- I came to Singapore for the first time in 2003, to speak as a CNRS researcher (of the Non Linear Institute of Nice) at a scientific seminar to which I had been invited by the French Embassy[3] and the Department of Physics of the NUS[4]. I was immediately seduced by Singapore; a real culture shock. I returned in 2005 for a year and a half for a research project, and to teach at NUS in the French Double Degree programme[5].

In 2006, as I mentioned before, Singapore was investing in research and scientific excellence. The Centre for Quantum Technologies (CQT) was about to obtain the status of Research Centre of Excellence and was looking to attract talents. On the French side, diplomacy was conducive to the development of international cooperation. The CNRS began to get interested in Singapore and gave me carte blanche to initiate a Franco-Singaporean collaboration within the structure of the CQT.

The negotiations with the Director of the CQT, Prof Artur Ekert, led in 2008 to the establishment of joint research projects, and materialized with the expatriation (to Singapore) of three full-time French researchers, one of whom is me. An International Associate Laboratory (LIA), the France-Singapore Quantum Physics and Information Laboratory (FSQL), was created in 2010, which I co-directed with Prof Berthold-Georg Englert of the CQT. This is the laboratory that became the International Mixed Unit (UMI) called MajuLab in 2014.

The other two French researchers involved, Benoît Grémaud (CNRS Researcher - Kastler-Brossel Laboratory) and David Wilkowski (Lecturer at the University of Nice) also work full-time at MajuLab. Lastly, Miklos Santha (CNRS Researcher at The LIAFA, Laboratoire d'Informatique Algorithmique: Fondements et Applications) is a regular long-term visitor to CQT in the framework of this collaboration.



The MajuLab laboratory at SPMS, NTU – Fundamental research installation for quantum physics and cold atoms experiences.

French science diplomacy appears to have played an important role in your experience in Singapore. What place does this have in the success of your projects?

- The actions of science diplomacy and the Embassy have an extremely positive impact on our activity. Even if researchers do not wait for public authorities to work together, they are a major support in the success of negotiations and scientific cooperation on this scale.

The signing ceremony that created the two new UMIs in Singapore, MajuLab (physics) and BMC³ (biology), and the renewal of the UMI CINTRA (CNRS International NTU THALES Research Alliance) took place on 30 May 2014, in the presence of high level executives from the partner institutions and an official French delegation alongside the French Ambassador to Singapore, M. Benjamin Dubertet.

One must be aware of the quality of French research. Especially in the areas covered by MajuLab, three French Nobel prize winners : Claude Cohen-Tannoudji (1997), Albert Fert (2007) and Serge Haroche (2012). Singapore is particularly interested in our scientific excellence.

The City-State recognises the CNRS as a major scientific global player and encourages our talented researchers to emigrate. The scientific diplomacy and the actions of the French Embassy in Singapore help in establishing collaborations rather than capturing talents, and that is very important.

One tool used in scientific collaboration is the PHC MERLION[6]. What is your view of this programme?

- MERLION is a unique and remarkable tool which I particularly appreciate. It is awfully efficient and useful! Financing the mobility of researchers, it is laying the first cornerstone in exchanges and scientific collaboration.

To start, let's take the « MERLION Workshop » programme which finances seminars and conferences in France or Singapore. When researchers participate in these events, they exchange on common areas, present their works and create connections that will later allow them to continue working together. It's very important to initiate collaborations and to give visibility to our research; there is a real knock-on effect.

In addition, a seminar organized with the support of MERLION has a sort of Quality Label that in itself empowers the trust of the partners. Notably, we were able to organize the only Summer School of the Houches held outside of France, in Singapore in 2009, in collaboration with the CQT, NTU and the prestigious Les Houches School of Physics.

To continue with these workshops, when joint research projects between laboratories have been identified, trips and visits are necessary to fix the detail of the collaborations. It is in this context that the « MERLION Project » provides assistance and is perfectly appropriate.

Lastly, « MERLION Ph.D » is an extremely interesting programme because sharing a Ph.D student for three years offers the best way to “solidify” the collaboration that was initiated. This programme, for Singaporean Ph.D students wishing to complete their training in a French laboratory of excellence, offers favorable study conditions by providing accommodation assistance in France and one round-trip air ticket per year. Taking into account the costs between France and Singapore, such a support would be very complicated for us, to not say impossible, without a MERLION Ph.D.

In the space of 10 years, since the creation of the programme in 2006, you obtained seven MERLION funding ((2 workshops, 2 projects and 3 Ph.Ds), which is remarkable. How do you explain this?

- I don't know if I can explain it, but I would say that in the first place that the acceptance rate is very high (it is 25%), which indicates that the tool is well managed and effective. And then, it seems to me that the objectives and selections criteria are clear. We pay careful and meticulous attention to the constitution of our applications, in order that they may be selected despite the strong competition from the other laboratories!

I also think that the projects we presented were in line with the objectives of the MERLION programme, which are to develop scientific and technological exchanges of excellence between research laboratories of the two scientific communities, by fostering new cooperation. This is what we sought to do these past 10 years, and we will continue to do so in the future, because it is the key to the success of ambitious projects in fundamental research. Since our first MERLION in 2007, we have made some 20 publications in various scientific journals, which are a direct result of the MERLION collaborations we have had; which is a significant and shows our ambition and our value.

Let's talk about the future. What are your current MERLION projects or those coming soon, and what are your projects for the future?

- My CQT Ph.D student, Sanjib Ghosh, is a MERLION Ph.D holder since 2013. He is currently, since March and until July, with his French co-supervisor, Dominique Delande, at the Kastler-Brossel Laboratory. Sanjib is working on quantum transport and the Anderson localization. This collaboration has already produced two publications in scientific journals with a high impact factor and we are in the process of preparing a third. Sanjib will defend a very good thesis. It's a perfect example of a successful collaboration and scientific excellence that the MERLION programme has efficiently helped to produce.

We also have a MERLION workshop planned for the month of November 2016. It's about a one-week conference in Singapore on quantum technologies, organised by MajuLab and the CQT, in collaboration with the University of Grenoble and Thales, and with the local participation of NUS, SUTD and NTU.

Our conference is a perfect echo of the "quantum manifest" [7] that calls for the European Union to make a significant investment in quantum technologies, which will, in the future, have a profound impact on research, whether fundamental or applied. We also plan to organize institutional visits, on the sidelines of the conference. A proof, that scientific diplomacy is continuously present to support and develop scientific collaborations.

Lastly, I must start to consider the renewal of MajuLab in end 2017. We are beginning now to implement other initiatives and research projects, in different areas such as surface chemistry, or nanosciences and nanotechnologies. The quality and French science excellence are fundamental assets in this search for partnerships. So far we have been successful in this, and I can only welcome the support, over time, of the CNRS and the Science Section of the Embassy, and our fruitful relations with our laboratory partners, in France and Singapore.

In Brief :



MajuLab is a multi-disciplinary fundamental research laboratory (working on topics) ranging from quantum physics to soft matter and materials, with a very distinct tropism in information and quantum calculations, in particular on quantum gases and strongly correlated systems. One of the experimental activities is based on obtaining a “condensate” of Strontium cold atoms and the study of the associated quantum physics phenomenon.

The name MajuLab comes from the Malay word Maju which means “to go forward, to continue, to progress”, and the expression Majulah Singapura, which is the national anthem of Singapore and very deeply rooted in society with its idea of progress, perseverance and moving forward.

MajuLab is what we call an International Mixed Unit (UMI), i.e. a laboratory created in partnership with French and foreign research groups which brings together scientists, students and post-docs from each partner institution. It’s the highest level of international scientific collaboration. MajuLab is a partnership between the CNRS, the University of Nice Sophia Antipolis, the National University of Singapore (NUS) and the Nanyang Technological University (NTU).

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[1] The NSTB (National Science and Technology Board) has been established in 1991 <http://eresources.nlb.gov.sg/history/events/9addb3d8-62eb-420a-a10a-3727f790259c>

Then become A*STAR (Agency for Science Technology And Research) in 2002.

[2] The National Research Foundation (NRF) and the Ministry of Education (MOE) established the Research Centres of Excellence (RCE) in 2007 to spur research excellence in the local universities. This programme saw the set-up of 5 research centres to carry out world-class research aligned with the long-term strategic interests of Singapore.

<http://www.nrf.gov.sg/about-nrf/programmes/research-centres-of-excellence#sthash.kTtimsIM.dpuf>

[3] Bernard Luciani, Central Director of security of CNES, was between 2002 and 2006, Counsellor for Culture, Science and Education at the French Embassy in Singapore.

[4] By Prof Berthold-Georg Englert, currently deputy Director of MajuLab.

[5] The French–NUS Double Degree Programme (FDDP) with the French Grandes Écoles provides the opportunities to learn from the best of both worlds, exposure to foreign cultures, networking with Singaporeans and foreigners, and proficiency in a third language.

<http://www.fddp.nus.edu.sg/>

[6] The «MERLION» programme is a joint franco-singaporean collaboration. Launched and managed by the Science Section of the French Embassy in Singapore, the programme initiates and encourages scientific exchanges between laboratories in both countries through the funding of researcher mobility.

More at our article: [Scientific Cooperation : The Merlion Programme is 10 !](#)

[7] <http://qurope.eu/manifesto>