

EXPERT PORTRAIT

ALAIN LESTRADE, HEAD OF THE ALIGNMENT/ METROLOGY GROUP



Alain Lestrade doing offset measurements of the DISCO beamline cold finger fiducials

When did you join the world of synchrotrons?

In the early 90s, a maintenance contract with the Grenoble-based company in which I was then a surveyor, led me to work at the ESRF. I finally stayed 12 years, specifically in charge of alignment of the storage ring and basic calibration. When the SOLEIL project restarted, I joined the team working from the detailed pre-project (APD); this was in January 2002. I had meanwhile acquired knowledge, away from the synchrotron environment, in optics and electronics through resuming my studies in the field of microwave & optics.

What does your work consist of?

The Alignment/Metrology group became involved very early on in the project on

the “instrument” side and it is always beneficial to be present upstream of a project. This allowed us to agree with the Sources Division on the design, construction and installation of beams supporting the various magnets that guide the electron beam. It is easy to understand that, to guarantee precision and reliability in the beam path, the positioning of each element of the accelerators and storage ring is critical. This necessary accuracy was pushed to the extreme in the case of SOLEIL:

The objective was to achieve 20 microns between magnets on the girders, and 50 microns between adjacent girders. The specifications followed and methods used at SOLEIL were those chosen during the detailed pre-project stage. But we are also present alongside those responsible for beamlines, starting with their design, in parallel with our work with Sources. I remember, for example, meetings with the CASSIOPEE or DESIRS groups while we were in ALGECO as part of the d’Orsay Faculty: even though the first stone had not even been laid at SOLEIL!

This double interaction with Sources and Experiments already existed at ESRF. But at SOLEIL this has been reinforced by the beamlines. In addition, we are in permanent contact with the Optics group, headed by François Polack

(see Rayon de SOLEIL n°19, p10): these exchanges occur on a daily basis. I wanted the alignment work at SOLEIL to extend beyond the traditional framework covering the very principles of purely geometric techniques, usually adopted in synchrotrons. It was not possible to stay within the usual definition, i.e. “the measurement of large dimensions.” Geometry remains an essential tool for us, but only one tool among many. This is, I think, the originality of the approach chosen by our group.

How do you define this process?

Always to analyze as much as possible the components on which we work, by including the range of measurement methods available and using procedures from mechanics and optics, which are two fundamental aspects of a synchrotron. My engineering background has undoubtedly influenced this approach. Specifically, we have redesigned and developed several instruments, including ways to improve reliability and accuracy. This is for example the case of the wire ecartometer and HLS (Hydrostatic Leveling System), a kind of electronic “water level”, which will be installed along the entire length of NANOSCOPIUM. This is the beamline which, at present, has needed the most R&D, because of the conditions of extreme stability that it requires over

a long-distance: precision of up to a few hundredths of a micron (vertical movement) for the last 70 meters before reaching the sample. We started with a device already on the market, which we are now optimizing. Other challenges ahead: the accuracy of sample positioning under the photon beam, with for example, goniometers or, now, a translation stage required to operate the monochromator on the GALAXIES beamline. It should detect movement of about 5 nanometers! We need to rethink the entire assembly and measurement methods of our interferometer, in order to increase its resolution. Our work with the Experiments Division is far from over, as all the beamlines have not yet been built.

No time to get bored, it seems?

Indeed, no! Especially as I am preparing lectures, which I have been asked to give for years in-house as part of vocational training. Over the last few months I have delved into all the theoretical aspects of alignment and metrology to develop them further and to be up to answering my future “students”. This is another facet of my work that I have not really experienced before but which also motivates me a lot. Another new challenge!

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