



The CEA and CNRS are major French research agencies and IRIG (www.cea.fr/drf/irig) and I. Néel (<https://neel.cnrs.fr/>) are two of their institutes, devoted to fundamental research, in the Grenoble Minatec (minatec.org) area, that collaborate to run the French synchrotron beamlines (<http://f-crg.fr/>) at the ESRF (European Synchrotron Radiation Facility, esrf.eu). ESRF is a multinational research institute, also situated in Grenoble, that operates one of the most powerful synchrotron X-ray source. It offers a highly dynamic, exciting and multinational working environment in the French Alps.

Within the French beamlines at the ESRF, the CEA is seeking to recruit a:

Post-Doctoral Fellow (f/m):

***In situ* synchrotron surface X-ray diffraction : Experiments and development of analysis programs - Application to 2D materials**

THE SUBJECT

French research institutes run five synchrotron beamlines at the ESRF; one of which being dedicated to the investigation of 0D, 1D and 2D nano-materials, especially *in situ*, in ultra-high vacuum (UHV) or under gas, during their elaboration. A new coupled diffractometer/growth reactor has been developed recently, with a strong emphasis in using 2D detectors for diffraction and small angle scattering measurements.

Moreover, the ESRF synchrotron beam has been upgraded (<https://www.esrf.fr/about/upgrade>) recently, and the beamline optics will be also very soon. All these recent developments deeply transform the ways to acquire data and the amount of data gathered within a typical 6-day beamtime experiment.

We have developed the corresponding analysis programs to a certain point, but much more needs to be done to take full advantage of the new possibilities of the beamline and instruments, and to develop online computing tools to pre-analyze the data on-the-fly, while they are being acquired.

You will make use of a combined UHV-chamber/Molecular Beam Epitaxy (MBE) /Chemical Vapour Deposition (CVD) growth reactor located at the European Synchrotron (ESRF) in Grenoble. This “hybrid” reactor is coupled to a diffractometer and a high-energy X-ray synchrotron beamline (BM32). It allows detailed studies of the atomic structure/morphology of 2D layers or nanoparticules using grazing Incidence X-Ray diffraction/Scattering (GIXD/GIXS/GISAXS) and X-ray Reflectivity, in particular *in situ* during their growth or *operando*.

The instrument is run both for in-house experiments realized by the CEA and CNRS teams in charge, and by “external users” whose experiment proposals have been selected *via* program committees. The main research fields of local teams are new 2D materials in length with the development of graphene, and thin oxide films with specific magnetic properties. You will participate to in-house projects, and occasionally be asked to act as a “local contact” helping teams of external users that get access to this facility through

research proposals and scientific committees. You will also be in close contact with the team of postdocs and PhD fellows working in another ESRF beamline on the growth of 2D materials on liquid metals surfaces.

The experimental work will be done at the ESRF facility. You will learn to master the control of the beamline, surface diffractometer and reactor chamber, using the new fully Python-controlled BLISS control system. Then you will learn how to analyse data and further develop the computer analysis programs mostly written in Python. You will work in close collaboration with a team of research and assistant engineers, as well as scientists working in the field.

QUALIFICATIONS AND EXPERIENCE

You should hold a PhD in physics, chemistry or material science or closely related science and be strongly motivated by coding in Python to develop analysis programs. Previous experience with complex instrumental environment, and / or with synchrotron X-ray scattering / diffraction / reflectivity, especially on surfaces will be an advantage.

You should be motivated to work with an experimental setup at the forefront of instrumental development.

You should also have experience (or show high interest in learning) data analysis and analysis program development using Python-based programming languages.

In addition, you should have:

- Knowledge of relevant research topics in solid state physics or surface science;
- Ability and initiative to get to the heart of the problem and take it effectively through to completion;
- Good interpersonal, communication and presentational skills;
- Good organizational and planning skills;
- Ability to work as part of a multi-disciplinary team;
- Self motivation.

APPLICATION:

This is a full time CEA contract, renewable each year for two years, located at ESRF, France

Interested applicants should submit

- (1) 1 page cover letter stating motivation, research experience and goals, and anticipated available date;
- (2) curriculum vitae, and
- (3) contact information for 3 references (reference letters are not required at this time)

to Gilles Renaud:

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Application deadline: February 28, 2022