



The ESRF is a multinational research institute, situated in Grenoble, France and financed by 21 countries mostly European. It operates a powerful synchrotron X-ray source with some 30 beamlines (instruments) covering a wide range of scientific research in fields such as biology and medicine, chemistry, earth and environmental sciences, materials and surface science, and physics. The ESRF employs about 600 staff and is organized as a French *société civile*.

Within the Experiments Division, the Theory Group is now seeking to recruit a:

PhD Thesis Student

Subject: Calculating RIXS spectra of highly-correlated electron materials

GENERAL FRAMEWORK

A major experimental effort at the ESRF is devoted to using resonant inelastic x-ray scattering (RIXS) to uncover the fundamental pairing mechanism in high- T_c superconductors. The parent compounds of the copper-oxide based superconductors exhibit antiferromagnetic ordering at low temperature and it is believed that low energy spin excitations play an important role in the superconducting state. RIXS should lead to significant insights into the fundamental behaviour of high- T_c materials.

Theoretical insights will be necessary to keep the ESRF at the forefront during this exciting period in superconductivity research. Toward that objective, the Theory Group will expand our capabilities for calculating RIXS by including coupling of the core-excitation to bosonic modes, particularly phonons and magnons. This new methodology will be applied toward studying high- T_c superconductor materials in close collaboration with ongoing experimental efforts.

DESCRIPTION OF THE THESIS WORK

The objective of this thesis project is to extend the computational capability to calculate resonant inelastic x-ray scattering spectra (RIXS) by including interactions between the core-excitation and bosonic modes including phonons and magnons. This will be done within the context of an existing code that can already generate basic RIXS spectra. This code takes a first-principles description of the ground-state and treats electronic excitations within many-body perturbation theory (MBPT). Tasks involve the implementation of a formalism that has previously been demonstrated on simple electron gas models, but new descriptions of electron-magnon scattering at the MBPT level may need to be derived.

The candidate for this position should have a strong background in theoretical condensed matter physics as well as experience and interest in programming (fortran & scripting languages).

Place of Work: ESRF in Grenoble

Supervisor: K. Gilmore (+33) (0)4 76 88 17 27

The working language of the ESRF is English.

OUR OFFER

You should hold a degree in Physics or Chemistry allowing enrolment for a PhD, such as an MSc, Master 2 de Recherche, Laurea or equivalent. Further information on the post can be obtained from K. Gilmore (tel.: +33 (0)4 76 88 17 27, email: kgilmore@esrf.fr). For further information on employment terms and conditions, please refer to <http://www.esrf.fr/Jobs/Conditions>. The ESRF is an equal opportunity employer and encourages applications from disabled persons.

Contract of two years renewable (subject to satisfactory progress) for one year.

If you are interested in this position, please apply on-line at this address:
<http://www.esrf.fr/Jobs>.

Ref. CFR404 - Deadline for returning application forms: 26 August 2015

ESRF, The European Synchrotron
Human Resources - Recruitment
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