Séminaire : Problèmes spectraux en physique mathématique

Les séminaires ont lieu à l'**Institut Henri Poincaré**, 11 rue Pierre et Marie Curie, Paris.

Programme du lundi 12 novembre 2018, en **salle 01** (rez-de-chaussée)

— 11h15 - 12h15 : **François Nicoleau** (Nantes)
Scattering matrices for dissipative quantum systems.

We consider a quantum system S interacting with another system S' and susceptible of being absorbed by S'. The effective, dissipative dynamics of S is supposed to be generated by an abstract pseudo-Hamiltonian of the form $H = H_0 + V - iC^*C$. The generator of the free dynamics, H_0, is self-adjoint, V is symmetric and C is bounded. We study the scattering theory for the pair of operators (H, H_0). We establish a representation formula for the scattering matrices and identify a necessary and sufficient condition to their invertibility. This condition rests on a suitable notion of spectral singularity. Our main application is the nuclear optical model, where H is a dissipative Schrödinger operator and spectral singularities correspond to real resonances.
This is a joint work with Jérémy Faupin.

— 14h - 15h : **Fabio Pizzichillo** (Paris-Dauphine)
The Hardy inequality and the Dirac-Coulomb operator.

The free Dirac operator in $\mathbb{R}^3$ is defined as $H_0 = -i\alpha \cdot \nabla + m\beta \quad$ (for $m > 0$), where $\alpha = (\alpha_1, \alpha_2, \alpha_3)$ and β denote the so-called Dirac matrices.
This talk aims to show the connection between Hardy-type inequalities and the Dirac-Coulomb operator. Firstly, I will prove some sharp Hardy-type inequalities related to the Dirac operator. Then I will show how to define the distinguished selfadjoint realisation of $H_0 + \mathbf{V}$, with $\mathbf{V}$ a Hermitian matrix potential with Coulomb decay. Finally, I will focus on the spectral properties of Dirac-Coulomb operator. I will characterise its eigenvalues using the Birman-Schwinger principle. Moreover, I will show a bound from below of its discrete spectrum, and I will prove that this bound is reached if and only if $\mathbf{V}$ verifies some rigidity conditions.
This is a joint work with B. Cassano and L. Vega.

— 15h15 - 16h15 : **Christian Hainzl** (Tübingen)
The interacting Fermi gas : A step beyond Hartree-Fock.

We consider a homogenous Fermi gas interacting via a regular mean-field potential. We recover the correlation energy to leading order in the coupling parameter and we will make general remarks about the the correlation energy for Coulomb gases.

Pour tout renseignement, contacter les organisateurs
Hakim Boumaza (boumaza@math.univ-paris13.fr)
Mathieu Lewin (mathieu.lewin@math.cnrs.fr)
Stéphane Nonnenmacher (stephane.nonnenmacher@u-psud.fr)
https://www.math.u-psud.fr/~nonnenma/tournant/seminairetournant.html