**Title: Precision measurements with ultra-cold metastable atoms**

In the fast developing domain of ultracold atoms, cooling noble gases in a metastable state offers unique possibilities due to specific observation methods. The helium atom in its $2^3S_1$ metastable state (He*) provides a rich playground for several fields of physics. First it is a very simple atom, so that the atomic structure, as well as the molecular potentials between interacting atoms, can be calculated *ab ibitio* with great accuracy: high precision spectroscopy leads to refined tests of QED. Second two stable isotopes exist ($^4$He and $^3$He) which allows comparing bosonic and fermionic quantum properties.

The seminar will review some frequency metrology developed with gases of condensed He* atoms. Photoassociation methods lead to the formation of exotic giant dimmers, as well as to a very accurate determination of the s-wave scattering length of He* through the formation of atom-molecule dark resonances. Lifetimes of excited states could be compared to predictions. Recently a direct measurement of the $2^3S_1$ - $2^1S_0$ transition allowed stringent tests of QED and isotope shift theory.

At the end a brief survey will be given for the activity of IFRAF (research institute for cold atoms in the Paris area) in the field of degenerate quantum gases and cold atom instrumentation.

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