

Post-Doc in FEMTO-ST Institute (Besançon)

MAC@C60 project

Scope and aim:

The MAC@C60 project aims to explore the potentiality of a new solid state material containing trapped hydrogen atoms in a fullerene type of cage. The feasibility of a such hydrogen trapping was recently confirmed and patented. This opens the way to the development of a true chip scale atomic clock entering in competition with the acoustic waves solutions using piezo or Silicon. First samples of the compound are already available and preliminary experiments have been undertaken.

The basic proposal of this work is to explore the possibilities of exploiting the compound containing the trapped hydrogen atoms as the frequency reference to stabilize a microwave oscillator. This one year project aims to demonstrate a proof of concept permitting to determine the accessible performances. In that sense, the work consists in an important experimental part.

Context:

The MAC@C60 is a collaborative project between an industrial company based in Grenoble and the FEMTO-ST Institute in Besançon.

The global context is the market request of high accuracy / low size clocks. Ideal target is the microsecond level in a silicon Chip. Such a device will have applications in all system based or networks requiring accurate time (Telecom , industrial, localization, time transfer) and will also pave the way towards new innovative system.

The technology, generally called POSS (Polyhedral Oligometric Silsesquioxane) has emerged in recent years and is widely extending its applications. Various cages and various trapped atoms have been tested. Hydrogen EPR is well known basic physics domain. Combination of these two technologies lead to innovative devices, potentially exhibiting a so far unmatched compromise between size and performance.

The successful applicant is expected to carry out the research program, in the department Time and Frequency of Institute Femto-ST, and in cooperation with the industrial partner.

The position is open from March 2017 until fulfilled. The duration is for 1 year.

The applicant:

Must hold a PhD in experimental physics. Training, expertise in domains of atomic physics, atom interferometry, spectroscopy and/or atomic clock is a must, basic knowledge in microwave, analog electronics is a plus. Some basics in MEMS technology, digital electronics might be an advantage for further steps of industrialization but is not necessary at this stage of the development. The applicant should be autonomous and used to team work, based on strong interdisciplinary connections.

Full time position in Besançon, Working language French or English.

CV motivation letter and references should be sent to:

Dr. Vincent GIORDANO : giordano@femto-st.fr