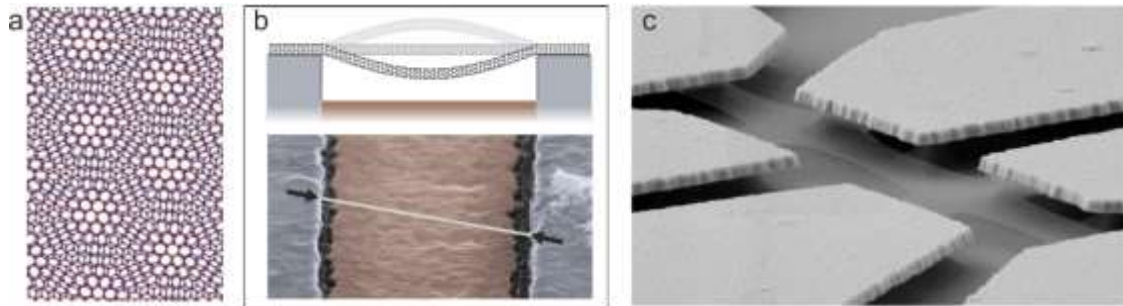


## PhD openings on “twisted graphene stacks” & “nanotube electromechanical resonators”

We are looking for candidates who are eager to do research in “**Quantum electron transport**” and “**electro-mechanics**”.



Graphene and carbon nanotubes form a class of nanoscale objects with exceptional electron properties. Recently, it was shown that the electron-electron interaction in graphene can be made sizeable by stacking two sheets of graphene that are twisted relative to each other by a small angle. In this way, unconventional superconductivity and the Mott insulating state were discovered. Here, we propose to explore new types of twisted bilayer graphene devices in order to understand how superconductivity emerges from the strong interaction between electrons.

In a second series of experiments, we will couple the exceptional electron properties of carbon nanotubes to their mechanical vibrations. One objective is to experimentally demonstrate the long-sought-after ultra-strong coupling regime in a mechanical resonator: Electron states and vibrational states are no longer the eigenstates of the system, but the eigenstates are polaronic in nature.

Finally, we propose to study electromechanical resonators based on superconducting twisted bilayer graphene. This is the natural extension of the two series of experiments described above.

The work will be carried at **ICFO** located in Barcelona. Information on the host group can be found at [www.bachtoldgroup.icfo.eu](http://www.bachtoldgroup.icfo.eu).

Candidates should email a CV to [adrian.bachtold@icfo.eu](mailto:adrian.bachtold@icfo.eu)