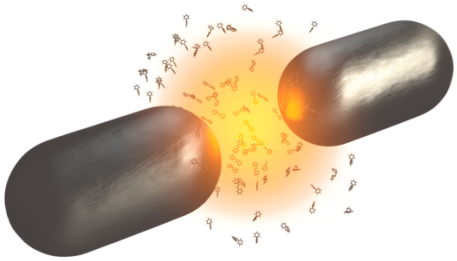
Available Postdoc positions

Department of Theoretical Condensed Matter Physics and IFIMAC
Universidad Autónoma de Madrid

There are two postdoc positions open to work on **Modification of Molecular Structure Under Strong Coupling to Confined Light Modes**. This project at the interface of quantum optics, molecular science, and condensed matter physics is financially supported by an **ERC Starting Grant** running from 2017 to 2022. All applicants should be highly motivated and enjoy working and collaborating closely within an international team.



The project is based on modern advances in nanophotonics that allow us to confine light modes so strongly that their effect on matter is felt even in the absence of external driving. In this regime of "strong coupling" or "vacuum Rabi splitting", the fundamental excitations are so-called polaritons, hybrid light-matter states which combine the properties of both constituents. The overarching goal of the project is to develop, refine and apply theoretical methods in order to understand the modification of molecular structure under strong coupling to confined light modes, and its effect on the dynamics of the formed polaritons.

The postdocs will work in one of two main research directions:

1) A **microscopic description of the coupled molecule-cavity system** explicitly including electronic, nuclear and photonic degrees of freedom. Standard quantum chemistry packages and concepts will be combined with the methods of quantum optics and polariton physics. Applicants are expected to have a strong background in (excited-state) quantum chemistry and preferably also the description of nuclear motion and nonadiabatic dynamics, and a willingness to learn about the concepts of quantum optics and quantized light fields.
2) Investigation of the **influence of internal molecular dynamics on polaritons in a macroscopic setting** involving large numbers of molecules and (quantized) light modes. This is the regime explored in most experiments up to now, which have found a complex interplay between internal dynamics (such as vibrational relaxation) and macroscopic effects (such as bosonic stimulation and condensation) due to the collective nature of the polaritons. Applicants are expected to have a strong background in many-body quantum optics and open quantum systems, and a willingness to learn about molecular physics and chemistry.

References:

[1] J. Galego, F. J. Garcia-Vidal, and J. Feist, Phys. Rev. X **5**, 41022 (2015).
[2] J. Galego, F. J. Garcia-Vidal, and J. Feist, Nat. Commun. **7**, 13841 (2016).

For further information and to apply, please contact Johannes Feist at johannes.feist@uam.es. Applications should include a cover letter, CV, and contact information for at least three references. Initial appointments will be for one year, with possible extension up to the duration of the project. Applications received until February 13, 2017 will receive full consideration. Applications received after this deadline may be considered until the positions are filled.

Relevant links:
http://johannesfeist.eu
http://ifimac.uam.es
http://mmuscles.eu (under construction)