**New PhD position in Astrophysics**

(September 2020)

**Subject:** Grain growth through accretion of elements onto grain surfaces: experiments and chemical modelling

**Supervisors:** Ilse De Looze (Ghent University), François Dulieu (LERMA, University of Cergy-Pontoise & Paris Observatory)

**Scientific context:**
The astronomical community is still divided about whether or not the growth of grains through the accretion of elements onto pre-existing grain seeds can take place in the interstellar medium of galaxies, and therefore contribute significantly to the overall dust budget in galaxies. The efficient destruction of dust grains compared to stellar dust production rates, suggests that we require grain growth as an alternative source of dust production. But a chemical formation route adequate to create dust grains through growth in the interstellar medium is still lacking. Dense regions have a favourable accretion rate of elements onto grain surfaces, but the fast formation of ice mantles in shielded regions of the interstellar medium is thought to impede dust growth. In more diffuse, less shielded regions, these ice mantles will not be able to form, but accretion rates tend to be lower, and photo-desorption and Coulomb repulsion can be additional hurdles to overcome. In order to understand whether grain growth can take place, we need to verify whether elements (1.) can stick onto grain surfaces, (2.) have sufficient time to reach a strong active bonding site, and (3.) are able to chemically bond with a pre-existing grain seed.

**Thesis work:**
The successful applicant will conduct laboratory experiments at LERMA to measure the diffusion and desorption energies for a range of elements and interstellar dust proxies. The results of these laboratory experiments will be used by the successful candidate to infer whether a viable chemical formation route to grow grains in the interstellar medium exists. The research will be conducted on the FORMOLISM2 experimental set-up ([https://lerma.obspm.fr/spip.php?article48&lang=fr](https://lerma.obspm.fr/spip.php?article48&lang=fr)).

**Practical details:**
The starting date can be as early as September 1st 2020 and should be no later than January 1st 2021. The position is fully funded for four years, and sufficient funding is available for short and long-term visits to the partner institutes. The successful candidate will need to take part in the laboratory experiments during a few months each year, but the residence location (Ghent or Clergy-Paris) for the remaining research time will be negotiable. The student will obtain a double degree awarded by each of the two universities, and will be able to attend doctoral courses at both institutions.

**Application:**
The applicant should hold a master degree in Astrophysics, Physics or Chemistry. Any prior experience (internship, master project...) in astrochemistry or experimental physics
will be considered as a positive asset, but is not required. The applicant must have excellent communication skills in English (oral and written), which will be the working language for the thesis. Applicants should submit their CV and arrange for two reference letters to be sent by February 28, 2020 to ilse.delooze@ugent.be.

**More details:** Please contact Prof. François Dulieu (francois.dulieu@u-cergy.fr) or Dr. Ilse De Looze (ilse.delooze@ugent.be).

**Useful references:**

https://ui.adsabs.harvard.edu/abs/2016A%26A...585A..146M/abstract  
https://ui.adsabs.harvard.edu/abs/2016MNRAS.463L..112F/abstract  
https://ui.adsabs.harvard.edu/abs/2018MNRAS.476.1371C/abstract  
https://ui.adsabs.harvard.edu/abs/2018ApJ...857...94Z/abstract