Internship on the design of DropSat:

A scientific Cubesat dedicated to study the physics of drops

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Place: LAM (Astronomy Laboratory Marseille) Marseilles, France

Field: aerospace & mechanical engineering

Context:

This internship will be done in the frame of a Nanosat project named “DropSat”. We intend to study the effect of microgravity on the physics of drops spreading, wetting and evaporation. In order to predict correctly the spreading then the evaporation dynamics of a drop in microgravity, we developed numerical simulations. We model the problem in 3D unsteady using specific boundary conditions. At this stage we need more experimental data to validate our numerical simulations. Long duration experiments are needed, and a dedicated nanosat is a solution to access long duration experiments.

Using a functional analysis of DropSat based on the existing experiments and knowledge (parabolic flights, sounding rocket and lab experiments), the objective of the internship is to initiate the work on different aspects of the Phase A that is: orbitography, thermal analysis, mechanical and electrical design, telemetry...

Skills needed: initiative, autonomy, curiosity.

Complementary information: an apartment on Campus and a standard CNRS living allowance of about 554€/month will be provided during the internship.

References:

- Brutin D., Starov V., Recent advances in droplet wetting and evaporation, Chemical Society Reviews, vol. 47, 558-585, 2018
- Semenov S., Carle F., Medale M., Brutin D., Boundary conditions for a one-sided numerical model of evaporative instabilities in sessile drops of ethanol on heated substrates, Physical Review E, vol. 96, 063113, 2017
- Semenov S., Carle F., Medale M., Brutin D., 3D unsteady computations of evaporative instabilities in a sessile drop of ethanol on a heated substrate, Applied Physics Letters, vol. 111, 241602, 2017
- Carle F., Semenov S., Medale M., Brutin D., Contribution of convective transport to evaporation of sessile droplets: Empirical model, *Int. J. Thermal Sciences*, vol. 101, pp. 35-47, 2016.

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