Master 2: ***International Centre for Fundamental Physics***

INTERNSHIP PROPOSAL

Laboratory name: LEGI/INRAE
CNRS identification code: UMR5519
Internship director'surname: Rastello
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Internship location: Grenoble

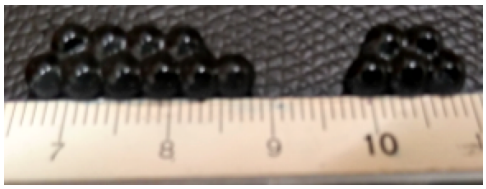
Thesis possibility after internship: YES
Funding: YES If YES, which type of funding: ANR

Title : **From optical index matching fluid/particles towards powder-snow avalanche modeling**

Summary

Powder-snow avalanches are one category of turbidity currents (self-sustained flowing particle suspensions) that are extremely dangerous and are very difficult to study on the field. To make it easier they are commonly studied in the Lab by a flow of brine in fresh water. Unfortunately, this type of study overlooks all the particle/fluid interactions that play a key role in the snow erosion process together with the flow sustainability. Optical fluid measurements with suspended particles is a challenge in itself given the opacity of the particles that hide most of the dynamics to the camera. The goal of the internship is to develop optical index matching particles that will be optically transparent and will enable the operator to see through them so as to measure all the fluid and particles needed quantities. The M2-student will not start from scratch since a couple tools have already been developed to generate first order optical index matching spheres that range in the expected diameters for the study. An important breakthrough is expected from this internship since being able to see through the particles would be a major step forward in the detailed study of flows with particles in general and turbidity currents/avalanches in particular.

Powder snow avalanche



Pre-test optical index matching spheres

Experimental skills and interest are highly expected. The internship can be followed by a phd. This work is supported by ANR and part of the PALAGRAM project.

Budwig, R. (1994). Refractive index matching methods for liquid flow investigations. *Experiments in Fluids* **17,** 350–355.
Rastello, M., & Hopfinger, E. J. (2004). Sediment-entraining suspension clouds: a model of powder-snow avalanches. *Journal of fluid mechanics*, ***509***, 181-206.

Condensed Matter Physics: YES Soft Matter and Biological Physics: YES
Quantum Physics: NO Theoretical Physics: NO