18. - 21. May 2015 Darmstadt, Germany
SHIM SWIFT HEAVY IONS IN MATTER 2015

Contribution ID: **171** Type: **Oral**

Swift heavy ion modifications of astrophysical water ice

Wednesday, 20 May 2015 10:30 (30 minutes)

In the relatively shielded environments provided by interstellar dense clouds in our Galaxy, infrared astronomical observations have early revealed the presence of low temperature (10-100 K) ice mantles covering tiny grain "cores" composed of more refractory material. These ices are of specific interest because they constitute an interface between a solid phase under complex evolution triggered by energetic processes and surface reactions, with the rich chemistry taking place in the gas phase. The interstellar ice mantles present in these environments are immersed in a flux of cosmic ray particles [1-3] that produces new species via radiolysis processes, but first affects their structure which may change and then induces desorption of molecules and radicals from these grains [4-6]. Theses cosmic rays can be simulated in the laboratory for a better understanding of astrophysical processes. The high-energy cosmic ray component (just below or above 100 MeV/u) was so far only scarcely simulated experimentally. Nevertheless, there is a clear need to study the interaction of high energy cosmic rays with ices, since the energy deposited on dust grains and ice mantles is expected to be important compared to protons and concomitant with UV photons. In particular, the physical state of the ice is extremely important in many respects for astrophysicists, to allow in particular surface physicist to perform experiments on realistic surfaces for a better understanding of interstellar chemistry. This talk will be dedicated to describe the evolution, in an astrophysical context and based on laboratory experiments, of the ice's physical state (amorphous, crystalline, metastable), including sputtering, resulting from the interactions with swift ions and photons.

[1] Shen et al. 2004, A&A,415, 203; [2] de Nolfo et al. 2006, Adv. Space Res., 38, 1558; [3] George et al. 2009, ApJ, 698, 1666 ; [4] Fama et al. 2010, Icarus, 207, 314; [5] Dartois et al. 2013, A&A 557, A97; [6] Mejía et al. 2015,Icarus, 250, 222.

Primary author: Dr DARTOIS, Emmanuel (Institut d'Astrophysique Spatiale-CNRS, Orsay France)

Co-authors: Dr DOMARACKA, Alicija (CIMAP-Ganil CAEN FRANCE); Dr DE BARROS, Ana (Physics Departament, Centro Federal de Educação Tecnológica Celso Suckow da Fonseca, Rio de Janeiro); Dr MEJIA GUAMÁN, Christian (Physics Departament, Pontifícia Universidade Católica do Rio de Janeiro); Prof. FROTA DA SILVEIRA, Enio (Physics Departament, Pontifícia Universidade Católica do Rio de Janeiro); Dr ROTHARD, Hermann (CIMAP-Ganil CNRS, Caen, France); Dr THOMAS, Jean-Charles (Ganil, Caen, France); Dr DING, Jing Jie (CIMAP--Ganil CAEN FRANCE); Dr GODARD, Marie (CSNSM-CNRS, Orsay, France); Dr CHABOT, Marin (CNRS-IN2P3, IPNO, ORSAY, FRANCE); Dr KAMALOU, Omar (GANIL CAEN FRANCE); Dr BODUCH, Philippe (CIMAP-Ganil CNRS, CAEN, FRANCE); Dr BRUNETTO, Rosario (IAS-CNRS, ORSAY, FRANCE); Dr PINO, Thomas (ISMO-CNRS, Orsay, France); Dr LV, Xue Yang (CIMAP-Ganil, Caen, France); Mr AUGÉ, basile (CIMAP/Caen, IAS/Orsay, France)

Presenter: Dr DARTOIS, Emmanuel (Institut d'Astrophysique Spatiale-CNRS, Orsay France)

Session Classification: Session 9

Track Classification: 00 - Invited talks