New Horizons Solvay Lectures in Chemistry

Prof. Cornelia Meinert
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Cornelia Meinert is a CNRS Research Director at the Université Côte d'Azur, Nice. After completing her chemistry studies at the universities of Rostock and Leipzig, she obtained her PhD on characterizing complex environmental samples with Werner Brack at the Helmholtz-Centre of Environmental Research in Leipzig. In 2013, after 4 years of PosDoc at the University of Nice, working on the asymmetric origins of amino acids, she has been nominated a permanent Research Scientist in physical chemistry by the French National Centre for Scientific Research (CNRS). She was awarded the CNRS Bronze Medal in 2018 and an ERC Starting Grant exploring a unified hypothesis of the emergence of biological homochirality (A-LIFE).

The cosmic origin of biomolecular chirality

'How did life choose its handedness?' Just like our hands mirror each other, but cannot be superimposed on each other, amino acids and sugars exist in left- and right-handed forms. Even if there appears to be no biochemical reason to favor one enantiomer over the other, life on Earth uses almost exclusively left-handed amino acids and right-handed sugars. This is called biological homochirality and it is inevitable for building functional proteins and RNA/DNA. Numerous experiments have confirmed that simple prebiotic molecules could have been synthesized both in space as well as on the early Earth. However, the preferential selection of one enantiomer over the other remains to date most likely explained by asymmetric interactions of stellar ultraviolet circularly polarized light (UV CPL) with chiral organics. The astrophysical origin of homochirality is strengthened by i) the detection of L-enriched amino and D-enriched sugar acids in meteoritic samples, ii) the detection of CPL in several star-forming regions as well as iii) experiments studying the interaction of UV CPL with prebiotically relevant chiral species. In this talk, I will highlight significant results on our on-going cometary ice simulation experiments (Fig. 1) as well as on circular dichroism and anisotropy spectroscopy as a key tool to decipher the response of chiral molecules to UV CPL. Moreover, I will present our major findings on recent asymmetric photosynthesis/photolysis experiments to discuss whether stellar UV CPL could have induced a common chiral bias across molecular families?

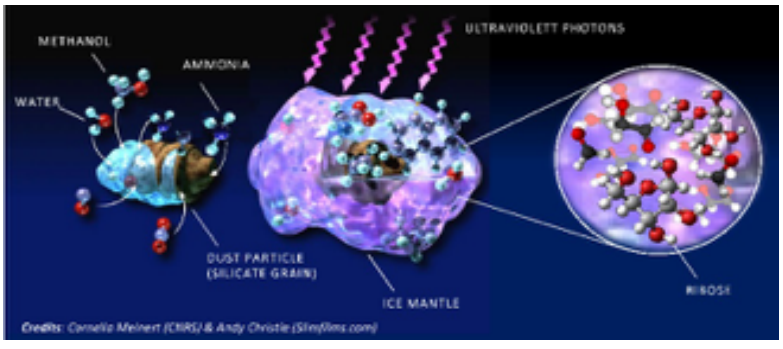

Figure 1: Ribose forms in the icy mantles of interstellar dust grains from simple precursor molecules (water, methanol, and ammonia) under high energy radiation.

Thursday 24 February 2022 at 4.00 pm.

COFFEE AND TEA WILL BE SERVED AT 3:45 P.M IN FRONT OF THE SOLVAY ROOM

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