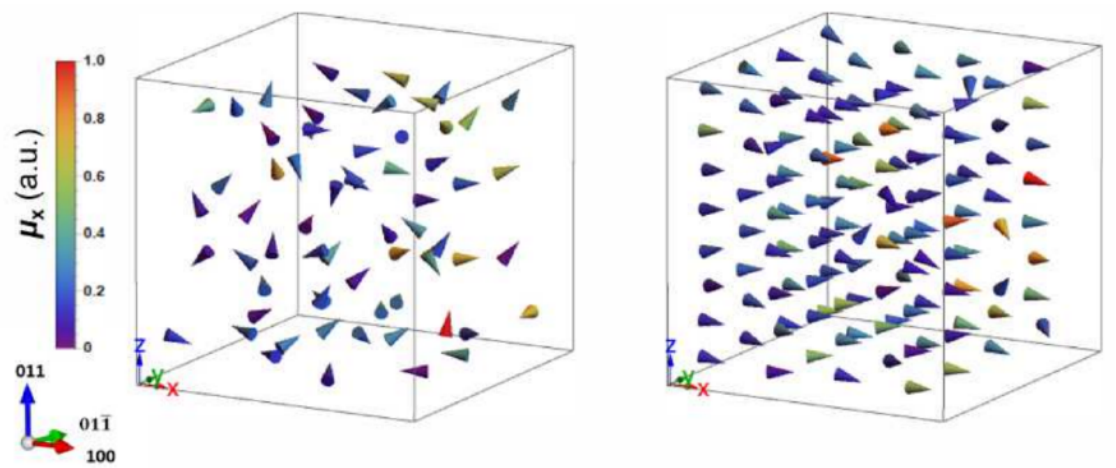


GREMAN seminar

THURSDAY
14
 MARCH



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Defects and multi-properties coupling in complex materials

2pm - 3pm (amphi F122 - Grandmont)

In materials with complex chemistry, even a small concentration of defects may lead to a heterogeneous meso- and nano-structure and properties that differ from what is expected based on the material's nominal crystal structure. One intriguing outcome of this complexity is the emergence of properties forbidden by the material's nominal, average symmetry. Another is multi-property coupling, where several variables simultaneously influence material's response, making the entangling of underlying processes difficult, yet interesting from both engineering and scientific viewpoints. In this talk, I will discuss oxide perovskites, hybrid metalo-organic perovskites, MAPbX_3 (where MA is methylammonium and $X=\text{Br}, \text{Cl}, \text{or I}$), and doped CeO_2 . Oxide perovskites are an interesting example of poorly understood spontaneous symmetry breaking on the nanoscale. We will demonstrate electro-chemo-thermo-photo-mechanical coupling in the hybrid perovskites. Although compositionally simple, doped CeO_2 exhibits a complex defect structure that can be manipulated by external electrical and mechanical fields, resulting in symmetry-forbidden electrical polarity, pyroelectricity, piezoelectricity, and electro-chemo-thermo-mechanical coupling. I will relate these findings to recent reports on a "giant" electromechanical response. Finally, I will provide a general comment on the communication of unusual results in scientific publications.