



## Invitation to a Seminar

**Prof. Simon J. L. Billinge**

Columbia University, New York  
*Department of Applied Physics and Applied Mathematics  
with Materials Science and Engineering*

**Wednesday 11.05.2022, at 11:30  
Aula Magna @ via Valleggio 11**

### **When hard materials act soft: Local symmetry breaking in bulk materials, how to find it, and why you should care about it.**

Modern materials under study for next generation technologies, such as for energy conversion and storage, environmental remediation and health, are highly complex, often heterogeneous and nanostructured. A full understanding of their structure requires us to go beyond crystallography and to study the local structure, which is a major experimental challenge. There are recently emerging powerful experimental developments, for example, using the atomic pair-distribution-function technique (PDF), among others. In this talk, I will focus on bulk materials that have distorted local structures, a potentially large class of materials where, nonetheless, this property has been largely overlooked. In particular, I will focus on materials where atomic or bonding orbitals are electronically active, driving the local atomic distortions. I will describe a new language we are developing for classifying these materials, and new modeling tools that are under development to reveal the local structures. I will also mention areas that need addressing in this endeavor.

Organized by DISCA and To.Sca.lab,  
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