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What Density Functional Theory can tell us about the Origins of the Universe

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Leaping from astronomical scales to the nanoscale might seem a gargantuan task. Common to both, however, is the concept of symmetry breaking and the formation of so-called topological defects. In the first part of this talk, I will discuss the formation of topological defects in multiferroic materials show how they can be used to study an early-universe theory, the Kibble-Zurek mechanism, in these functional materials. In the second part, I will talk about how new phenomena and materials are key for the search for the elusive dark matter, and discuss new routes to detecting ultra-light dark matter using quantum-mechanical calculations.