



INSTITUTE COLLOQUIUM

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4.00 pm

Fermion

Speaker:

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Title:

Looking for Complexity in Elementary Systems

Abstract:

Now that the ‘modern’ periodic table has completed exactly a hundred years of existence, one may be forgiven for assuming that virtually everything is known about the elements, except probably under extreme conditions of pressure and temperature. Nevertheless, even simple elements may exhibit unexpected and interesting behavior when their size is constrained in some manner. In other words, particle size is as effective as a thermodynamic parameter in exploring the property landscape of a solid. An introduction to the physical basis for this assertion would be followed by a couple of strikingly illustrative case studies. Silver, an extremely well-studied element, is a soft, white, highly conducting, chemically unreactive metal with a cubic structure. When dimensionally constrained, it is golden-yellow, hard, poorly conducting, chemically reactive, and adopts a hexagonal symmetry! In Selenium microtubes, we observe simultaneous magnetic and ferroelectric order though bulk Se shows neither! True ‘magneto-ferroelectrics’ are rare in nature, and this is only element in which such coexistence has so far been seen.
