

MAR16-2015-004170

Abstract for an Invited Paper
for the MAR16 Meeting of
the American Physical Society

Lars Onsager Prize: Phase transitions in massive data acquisition

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The rapid increase in the amount of data that is presently being generated, acquired and processed opens new perspectives in many branches of science. In order to take full advantage of this data revolution, and to turn it into a major tool for scientific discoveries, new concepts and methods need to be developed, thus allowing us to focus on the extraction of significant information. Referring to the case of compressed sensing, the talk will show how ideas and methods in statistical physics -from spin glass theory to crystal nucleation - can help design faster, less destructive, and more efficient signal acquisition protocols, with possible applications in numerous fields -from magnetic resonance imaging to astronomy, tomography, or gene interaction network reconstruction.