1046-68-474 **Valerio Pascucci*** (pascucci@acm.org). *Multi-Scale Morse Theory for Scientific Data Analysis.* Preliminary report.

Advanced techniques for understanding large scale scientific data are a crucial ingredient in modern science discovery. Developing such techniques involves a number of major challenges in management of massive data and quantitative analysis of scientific features of unprecedented complexity. Addressing these challenges requires interdisciplinary research in diverse topics including the mathematical foundations of data representations, algorithmic design, and the integration with applications in physics, biology, or medicine.

In this talk, I will present a discrete topological framework for the representation and analysis of large-scale scientific data. Due to the combinatorial nature of this framework, we can implement the core constructs of Morse theory without the approximations and instabilities of classical numerical techniques. We use topological cancellations to build multi-scale representations that capture local and global trends present in the data. The inherent robustness of our combinatorial algorithms allows us to address the high complexity of the feature extraction problem for high-resolution scientific data.

I will conclude the talk discussing the effectiveness of our approach in a number of practical examples. (Received September 04, 2008)