Special Information Science and Technology Seminar Speaker

Alexander Szalay
Johns Hopkins University

From Genes to Stars: The Fourth Paradigm

Thursday, August 8, 2013

2:00 - 3:00 PM

TA-3, Bldg. 0207, Room 216, Jemez/Cochiti Conference Rooms (Study Center)

Abstract: The talk will describe how science is changing as a result of the amazing amounts of data we are collecting from gene sequencers to telescopes and supercomputers. This "Fourth Paradigm of Science", predicted by Jim Gray, is moving at full speed, and is transforming one scientific area after another. The talk will present various examples on the similarities of the emerging new challenges and how Jim Gray's vision is realized by the scientific community.

Scientists are increasingly limited by their ability to analyze the large amounts of complex data available. These data sets are generated not only by instruments but also computational experiments; the sizes of the largest numerical simulations are on par with data collected by instruments, crossing the petabyte threshold this year. The importance of large synthetic data sets is increasingly important, as scientists compare their experiments to reference simulations. All disciplines need a new "instrument for data" that can deal not only with large data sets but the cross product of large and diverse data sets.

The talk will also describe how we are turning several of our simulations into publicly accessible numerical laboratories. These projects span across several types of data sets, from turbulence to cosmo-logy, and soon to include the output of ocean circulation models and atmospheric dynamics. These laboratories are being housed within our data-intensive instrument, the Data-Scope, supported by a recent MRI. There is an ongoing Teragrid project on MHD that will generate a several hundreds of TB datasets. There are several multi-faceted challenges related to this conversion, e.g. how to move, visua-lize, analyze and in general interact with Petabytes of data.

Biography: Alexander Szalay is the Alumni Centennial Professor of Astronomy at the Johns Hopkins University, and Professor in the Department of Computer Science. He is the Director of the Institute for Data Intensive Science. He is a cosmologist, working on the statistical measures of the spatial distribution of galaxies and galaxy formation. He is a Corresponding Member of the Hungarian Academy of Sciences, and a Fellow of the American Academy of Arts and Sciences. In 2004 he received an Alexander Von Humboldt Award in Physical Sciences, in 2007 the Microsoft Jim Gray Award. In 2008 he became Doctor Honoris Causa of the Eotvos University, Budapest.

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