

Columbia University Department of Physics

Particle Seminar Series



Wednesday, October 17, 2012 / 1:00 PM 705 Pupin Hall

“Deconvolution of data – solving inverse problems in (astro-) particle physics”

Inverse problems appear in any kind of indirect measurement process, be it the task of understanding a particle collision event by tracking its secondary particles, or to determine the energy of a cosmic event by measuring the light produced in the atmosphere by the resulting particle cascade. I will discuss these so-called "ill-posed" problems and present a statistical analysis technique which is commonly used to solve them: the method of unfolding or deconvolution of data. Besides the generic approach and the inherent difficulties such as oscillating solutions and the need for regularization methods, I will present the novel unfolding program TRUEE, which has been implemented by the astroparticle physics group at TU Dortmund. TRUEE offers a numerical, event-based solution of inverse analysis problems and makes use of the Tikhonov regularization method. I will illustrate the functionality of the program by presenting analysis examples from the MAGIC gamma-ray telescopes and the IceCube neutrino detector.

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