The Advanced Compton Telescope (ACT) is a scientific instrument designed to observe and measure the characteristics of Gamma-Ray bursts, including their locations in the sky and their energy content, in order to improve our understanding of the mechanisms that drive these phenomena. The ACT’s main goal is to achieve a sensitivity of 50 SNIa detections per year, with the potential to increase this number to 150 detections per year in the future. This goal is critical for advancing our understanding of the Universe and the processes that govern it.

Basis for Accurate Prediction of Instrument Sensitivity: The Simulated Measurement Data

The ACT Vision Mission Study Simulation Effort

The ACT Vision Mission Study effort is supported by NASA, and the team involved includes researchers from various institutions, including UC Berkeley, Los Alamos National Laboratory, and the University of New Hampshire. The team's primary focus is on developing a comprehensive simulation suite that can accurately predict the performance of the ACT instrument.

Flexible and Detailed Event Selection and Event Reconstruction Software – the MEGAlib package

The MEGAlib package is designed to simulate the detailed effects of atomic binding and polarization on photon scattering processes, allowing for accurate predictions of the ACT instrument's sensitivity. The package includes a suite of tools that can perform prompt de-excitation of excited nuclei, build-up and decay of radioactive isotopes, neutron transport and activation, and energy resolution calculations.

FlexRes

The FlexRes software is used to simulate the effects of cosmic-ray interactions and diffuse gamma rays on the ACT instrument, allowing for accurate predictions of the instrument's sensitivity in different configurations.

ACT Simulation Status and Outlook

The ACT Simulation Status and Outlook section outlines the current status of the ACT simulation effort, including the progress made in the simulation suite development and the outlook for future improvements. The section includes information on the ACT simulation pipeline, including improvements and enhancements of the CREME96 model, and the need for building on long-standing well-tested software packages.

For questions and comments, please contact us at wunderer@ssl.berkeley.edu.