

## [S05-1] Zipper Mode Data and Image Subtraction Analysis

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The Taiwan-America Occultation Survey (TAOS) aims to find small sized Kuiper Belt Objects (KBO) to estimate their number density and size distribution. TAOS uses four 50cm telescopes equipped with 2K CCDs and searches for stellar occultation events caused by KBOs with very high speed photometry of 0.2 seconds. This high time resolution is achieved by repeatedly shifting CCD charges along the y-axis during an exposure; the resulting image is called a zipper mode image where all stars repeat themselves at a regular interval. Brief occultations can be recovered by monitoring the brightness change of individual sources, which involves not only a large amount of computing but also serious problems with source overlaps and photometric stability. We are developing an efficient photometry strategy based on image subtraction, which removes all stable sources and let us concentrate on those sources which change brightness. This new method is robust against source overlaps and also very fast. In this paper, we introduce the main concept and demonstrate its superior performance by data simulations. This work was supported by Korea Research Foundation Grant (KRF-2002-070- C00045).

## [S05-2] Fabrication and Photon Detection Simulation of Nb/Al Superconducting Tunnel Junction

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We report the successful fabrication and photon detection simulation of the Nb/Al-based superconducting tunnel junctions. STJs with side-lengths of 20, 40, 60 and 80  $\mu\text{m}$  were fabricated by deposition of polycrystalline Nb/Al/AlOx/Al/Nb 5-layer thin films incorporated on a 3-inch Si wafer. Fabricated Nb/Al STJ shows 11% higher FWHM energy resolution than genuine Nb STJ. Photon detecting experiment of STJ was designed and simulated using a popular optics design package(ASAPTM 8.0). The simulation results were verified by the first order approximated theoretical estimations. The computational details as well as I-V curve test results are presented.

Keywords: Superconducting Tunnel Junction, Astronomical detector