**630**

## AN OPTIMIZED DETECTION SYSTEM FOR ASTRONOMICAL TRANSIENTS, LOCATED IN ANTARCTICA

D. G. York[1], L. Wang[2], C. R. Pennypacker[3], X. Cui[4], E. Cappellaro[5], M. Blouke[6], D. Q. Lamb[1], J. Storey[7], R. Malina[8], M. C. B. Ashley[7], S. Basa[8], X. Zhou[9], D. A. Harper[1], D. Sanford[1]

*[1]University of Chicago, Chicago, Illinois, United States, [2]Lawrence Berkeley Labs, Berkeley, California, United States, [3]Space Sciences Laboratory, Berkeley, California, United States, [4]Nanjing Institute of Astronomical Optics and Technology, Nanjing, Jiangsu, China, [5]Observatorio Astronomico di Padova, Padova, Italy, [6]Ball Aerospace and Technologies Corporation, Boulder, Colorado, United States, [7]University of New South Wales, Sydney, NSW, Australia, [8]Laboratoire d'Astrophysique de Marseille, Marseille, Cedex 12, France, [9]Chinese Academy of Sciences, Beijing, China*

We describe a concept for a system of 400 telescopes to detect rare astronomical transient sources with durations of < 10 seconds to many days. Each telescope has a diameter of 0.5 meters, a field of view of 20 square degrees and a fixed position in altitude and azimuth The design goals are reliable detection of non-repeating transients; acquisition of continuous light curves for the transients; and the triggering of follow-up observations from a large, well-instrumented telescope at the same site as the array.

The rotation of the Earth causes the images to drift across the CCD detectors at each telescope focus. Charge is shifted in the CCDs at an appropriate rate to avoid blurring. Small CCD segments (~20x4000 arcsec) are read out every 5 or 10 seconds to provide the basic integrations.. For a given field, these can be co-added to reach fainter limits (> 100 times fainter in one day.)

The system provides continuous sky coverage each polar winter of 4000-8000 square degrees. Various classes of astronomical sources can be studied. For example, optical transients (“afterglows”) associated with gamma-ray bursts (GRBs) will be detected. One every 10 days is expected. The fainter but longer signals from “orphan afterglows” (caused by the highly beamed GRBs, but seen from the side) will be detected. Dozens per day are expected. Finally, the flash from some types of supernovae (timescales of 2 minutes) should be seen (more than 5 per day.)

Optical transients went undetected until the 1990s, when studies of GRBs led to their detection. The array will permit the first survey of the transient sources. The survey should shed light on the nature of supernova explosions, on the nature of the first stars and on the cosmological constants. (GRBs can be seen to the edge of the Universe). The array will be important in confirming or searching for neutrinos from supernova explosions and for gravitational waves from merging neutron stars and black holes. Other known variables and unexpected sources will also be seen, and investigated.