

Purpose of Abstract: Student talk, poster

DEVELOPMENT OF A PROTOTYPE FOR A FLUORESCENCE DETECTOR ARRAY OF SINGLE-PIXEL TELESCOPES

Toshihiro Fujii^{1,2}, Max Malacari³, Mario Bertaina⁴, Marco Casolino⁵, Bruce Dawson³,
Jiaqi Jiang¹, Ariel Matalon¹, John Matthews⁶, Pavel Motloch¹, Paolo Privitera¹,
Yoshiyuki Takizawa⁵, K. Yamazaki⁷

¹ Kavli Institute for Cosmological Physics, University of Chicago, Chicago, IL, USA

² Institute for Cosmic Ray Research, University of Tokyo, Kashiwa, Chiba, Japan

³ University of Adelaide, Adelaide, S.A., Australia

⁴ Dipartimento di Fisica Generale, Università di Torino, Torino, Italy

⁵ RIKEN Advanced Science Institute, Wako, Saitama, Japan

⁶ High Energy Astrophysics Institute and Department of Physics and Astronomy, University of Utah, Salt Lake City, Utah, USA

⁷ Graduate School of Science, Osaka City University, Osaka, Osaka, Japan

amatalon@uchicago.edu

The origin and nature of ultra-high energy cosmic rays (UHECRs) is one of the most intriguing scientific mysteries in the field of astrophysics. UHECRs are the most energetic particles in the universe, but at the highest energies the arrival rate of these particles incident on the earth's atmosphere is less than one per century per square kilometer. Due to the very low flux of cosmic rays at the highest energies, these particles cannot be detected directly, and instead their energy, arrival direction, and mass composition must be inferred from measurements made by very large ground based detectors using the atmosphere above them as their detection volume.

The Fluorescence detector Array of Single-pixel Telescopes (FAST) is an R&D project for the next generation experiment to observe ultra-high energy cosmic rays. The FAST design, with a single 8" photomultiplier tube at the focus of a large Fresnel lens or mirror, is significantly cheaper than the standard Fluorescence Detectors, and will provide coverage of a large area at a low cost.

We report on first tests of a FAST prototype at the Telescope Array site, which used a 1 m² Fresnel lens system of the Japanese Experiment Module-Extreme Universe Space Observatory (JEM-EUSO) experiment as collecting optics.



The Telescope Array Site in Utah (photo taken by Toshihiro Fujii)