CLUSTERS OF COSMIC RAYS ABOVE 10¹⁹EV OBSERVED WITH AGASA

M. Chikawa (2), M. Fukushima (1), N. Hayashida (1), K. Honda (3), N. Inoue (4), K. Kadota (5), F. Kakimoto (5), S. Kakizawa (6), K. Kamata (7), S. Kawaguchi (8), S. Kawakami (9), Y. Kawasaki (10), N. Kawasumi (11), E. Kusano (12), A. M. Mahrous (4), K. Mase (1), T. Minagawa (1), Y. Morizane (2), M. Nagano (13), H. Ohoka (1), S. Osone (1), N. Sakaki (10), M. Sasaki (1), M. Sasano (14), K. Shinozaki (4), **M. Takeda** (1), M. Teshima (1), R. Torii (1), I. Tsushima (11), Y. Uchihori (15), T. Yamamoto (1), K. Yasui (2), S. Yoshida (1), H. Yoshii (16) and T. Yoshikoshi (9)

(1) Institute for Cosmic Ray Research, University of Tokyo, Chiba 277-8582, Japan, (2) Department of Physics, Kinki University, Osaka 577-8502. Japan, (3) Faculty of Engineering, Yamanashi University, Kofu 400-8511, Japan, (4) Department of Physics, Saitama University, Urawa 338-8570, Japan, (5) Department of Physics, Tokyo Institute of Technology, Tokyo 152-8551, Japan, (6) Faculty of Science, Shinshu University, Matsumoto 390-8621, Japan, (7) Nishina Memorial Foundation, Komagome, Tokyo 113-0021, Japan, (8) Faculty of Science and Technology, Hirosaki University, Hirosaki 036-8561, Japan, (9) Department of Physics, Osaka City University, Osaka 558-8585, Japan, (10) RIKEN (The Institute of Physical and Chemical Research), Saitama 351-0198, Japan, (11) Faculty of Education, Yamanashi University, Kofu 400-8510, Japan, (12) KEK, High Energy Accelerator Research Organization, Institute of Particle and Nuclear Studies, Tsukuba 305-0801, Japan, (13) Department of Applied Physics and Chemistry, Fukui University of Technology, Fukui 910-8505, Japan, (14) Communications Research Laboratory, Ministry of Posts and Telecommunications, Tokyo 184-8795, Japan, (15) National Institute of Radiological Sciences, Chiba 263-8555, Japan, (16) Department of Physics, Ehime University, Matsuyama 790-8577, Japan.

Arrival direction distribution of extremely high energy cosmic rays observed with the Akeno Giant Air Shower Array (AGASA) is studied. While no statistically significant large-scale anisotropy is found on the celestial sphere, some small-scale anisotropy – clustering of cosmic rays – is observed. Above 4×10^{19} eV, there are one triplet and six doublets within separation angle of 2.5° and the probability of observing these clusters by a chance coincidence under an isotropic distribution is now order of 10^{-3} . The self-correlation separation angle distribution shows a sharp peak within 2.5°, which is consistent with the angular resolution of the AGASA experiment. So, the clusters of AGASA events favor point-source of EHECRs.