



Measurement of the lateral distributions of electromagnetic component to study the chemical composition of the cosmic rays in the knee energy region

THE TIBET AS γ COLLABORATION

M. AMENOMORI¹, X. J. BI², D. CHEN³, S. W. CUI⁴, DANZENGLUOBU⁵, L. K. DING², X. H. DING⁵, C. FAN⁶, C. F. FENG⁶, ZHAOYANG FENG², Z. Y. FENG⁷, X. Y. GAO⁸, Q. X. GENG⁸, H. W. GUO⁵, H. H. HE², M. HE⁶, K. HIBINO⁹, N. HOTTA¹⁰, HAIBING HU⁵, H. B. HU², J. HUANG¹¹, Q. HUANG⁷, H. Y. JIA⁷, F. KAJINO¹², K. KASAHARA¹³, Y. KATAYOSE³, C. KATO¹⁴, K. KAWATA¹¹, LABACIREN⁵, G. M. LE¹⁵, A. F. LI⁶, J. Y. LI⁶, Y.-Q. LOU¹⁶, H. LU², S. L. LU², X. R. MENG⁵, K. MIZUTANI^{13,17}, J. MU⁸, K. MUNAKATA¹⁴, A. NAGAI¹⁸, H. NANJO¹, M. NISHIZAWA¹⁹, M. OHNISHI¹¹, I. OHTA²⁰, H. ONUMA¹⁷, T. OUCHI⁹, S. OZAWA¹¹, J. R. REN², T. SAITO²¹, T. Y. SAITO²², M. SAKATA¹², T. K. SAKO¹¹, M. SHIBATA³, A. SHIOMI^{9,11}, T. SHIRAI⁹, H. SUGIMOTO²³, M. TAKITA¹¹, Y. H. TAN², N. TATEYAMA⁹, S. TORII¹³, H. TSUCHIYA²⁴, S. UDO¹¹, B. WANG⁸, H. WANG², X. WANG¹¹, Y. WANG², Y. G. WANG⁶, H. R. WU², L. XUE⁶, Y. YAMAMOTO¹², C. T. YAN¹¹, X. C. YANG⁸, S. YASUE²⁵, Z. H. YE¹⁵, G. C. YU⁷, A. F. YUAN⁵, T. YUDA⁹, H. M. ZHANG², J. L. ZHANG², N. J. ZHANG⁶, X. Y. ZHANG⁶, Y. ZHANG², YI ZHANG², ZHAXISANGZHU⁵ AND X. X. ZHOU⁷

¹Department of Physics, Hirosaki University, Hirosaki 036-8561, Japan. ²Key Laboratory of Particle Astrophysics, Institute of High Energy Physics, Chinese Academy of Sciences, Beijing 100049, China. ³Faculty of Engineering, Yokohama National University, Yokohama 240-8501, Japan. ⁴Department of Physics, Hebei Normal University, Shijiazhuang 050016, China. ⁵Department of Mathematics and Physics, Tibet University, Lhasa 850000, China. ⁶Department of Physics, Shandong University, Jinan 250100, China. ⁷Institute of Modern Physics, SouthWest Jiaotong University, Chengdu 610031, China. ⁸Department of Physics, Yunnan University, Kunming 650091, China. ⁹Faculty of Engineering, Kanagawa University, Yokohama 221-8686, Japan. ¹⁰Faculty of Education, Utsunomiya University, Utsunomiya 321-8505, Japan. ¹¹Institute for Cosmic Ray Research, University of Tokyo, Kashiwa 277-8582, Japan. ¹²Department of Physics, Konan University, Kobe 658-8501, Japan. ¹³Research Institute for Science and Engineering, Waseda University, Tokyo 169-8555, Japan. ¹⁴Department of Physics, Shinshu University, Matsumoto 390-8621, Japan. ¹⁵Center of Space Science and Application Research, Chinese Academy of Sciences, Beijing 100080, China. ¹⁶Physics Department and Tsinghua Center for Astrophysics, Tsinghua University, Beijing 100084, China. ¹⁷Department of Physics, Saitama University, Saitama 338-8570, Japan. ¹⁸Advanced Media Network Center, Utsunomiya University, Utsunomiya 321-8585, Japan. ¹⁹National Institute of Informatics, Tokyo 101-8430, Japan. ²⁰Tochigi Study Center, University of the Air, Utsunomiya 321-0943, Japan. ²¹Tokyo Metropolitan College of Industrial Technology, Tokyo 116-8523, Japan. ²²Max-Planck-Institut für Physik, München D-80805, Deutschland. ²³Shonan Institute of Technology, Fujisawa 251-8511, Japan. ²⁴RIKEN, Wako 351-0198, Japan. ²⁵School of General Education, Shinshu University, Matsumoto 390-8621, Japan. huang@icrr.u-tokyo.ac.jp

Abstract: Lateral distributions of electromagnetic component in extensive air showers at different zenith angles measured with the Tibet-III air shower array are compared with Monte Carlo simulations based on the interaction models of QGSJET01c and SIBYLL2.1 taking into account of the detector configurations. In this paper, we discuss the sensitivity of the lateral distribution of the electromagnetic component to the chemical composition of the cosmic rays and also to the hadronic interaction models.