Temperature Effects in the ATIC BGO Calorimeter

J. Isbert (8), J.H. Adams, Jr (1), H.S. Ahn (2), G.L. Bashindzhagyan (3), K.E. Batkov (3), J. Chang (4,5), M. Christl (1), A.R. Fazely (6), O. Ganel (2), R.M. Gunashingha (6), T.G. Guzik (8), K.C. Kim (2), E.N. Kouznetsov (3), Z.W. Lin (7), M.I. Panasyuk (3), A.D. Panov (3), W.K.H. Schmidt (5), E.S. Seo (2), N.V. Sokolskaya (3), John W. Watts (1), J.P. Wefel (8), J. Wu (2), and V.I. Zatsepin (3)

(1) Marshall Space Flight Center, Huntsville, AL, USA, (2) University of Maryland, Institute for Physical Science & Technology, College Park, MD, USA, (3) Skobeltsyn Inst. of Nuclear Physics, Moscow State University, Moscow, Russia, (4) Purple Mountain Observatory, Chinese Academy of Sciences, China, (5) Max-Planck Institut for Solar System Research, Katlenburg-Lindau, Germany, (6) Southern University, Department of Physics, Baton Rouge, LA, USA, (7) University of Alabama, Huntsville, AL, USA, (8) Louisiana State University, Department of Physics and Astronomy, Baton Rouge, LA, USA, (isbert@phunds.phys.lsu.edu / Fax: 225-578-1222 / Phone: 225-578-8599)

The Advanced Thin Ionization Calorimeter (ATIC) Balloon Experiment contains a segmented calorimeter composed of 320 individual BGO crystals (18 radiation lengths deep) to determine the particle energy. Like all inorganic scintillation crystals, the light output of BGO depends not only on the energy deposited by particles but also on the temperature of the crystal. ATIC had successful flights in 2000/2001 and 2002/2003 from McMurdo, Antarctica. The temperature of balloon instruments varies during their flights at altitude due to sun angle variations and differences in albedo from the ground and is monitored and recorded. In order to determine the temperature sensitivity of the ATIC calorimeter, the instrument was temperature cycled in the thermal vacuum chamber at the CSBF in Palestine, TX. The temperature dependence, derived from the pulse height response to cosmic ray muons at various temperatures, is discussed and compared to values in the literature.