

10-26-2012

Muon Contribution to Cathodoluminescence Tests?

Justin Dekany

Allen Anderson

JR Dennison

Utah State University

Follow this and additional works at: http://digitalcommons.usu.edu/mp_post

 Part of the [Physics Commons](#)

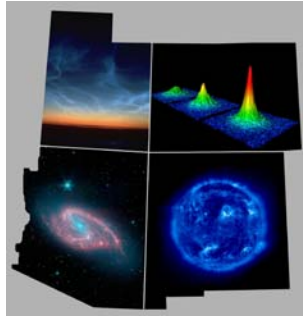
Recommended Citation

Dekany, Justin; Anderson, Allen; and Dennison, JR, "Muon Contribution to Cathodoluminescence Tests?" (2012). American Physical Society Four Corner Section Meeting. *Posters*. Paper 19.
http://digitalcommons.usu.edu/mp_post/19

This Poster is brought to you for free and open access by the Materials Physics at DigitalCommons@USU. It has been accepted for inclusion in Posters by an authorized administrator of DigitalCommons@USU. For more information, please contact dylan.burns@usu.edu.



Fall 2012 Meeting of the Four Corner Section of the
American Physical Society



*New Mexico Institute of Mining and Technology
Socorro, NM
October 26-27, 2012*

Muon Contribution to Cathodoluminescence Tests?

Justin Dekany, Allen Andersen and JR Dennison

Physics Department, Utah State University

Abstract

Tests of composites incorporating highly disordered insulating materials that were bombarded with low-flux keV electron beams exhibited three distinct forms of light emission: short-duration ($\ll 1$ s), high intensity luminous electrostatic discharges between the insulator and ground—termed “arcs”; intermediate-duration (10-100 s), intense surface emissions—termed “flares”; and lower intensity, continuous surface cathodoluminescent “glow”. During long-duration experiments at temperatures < 150 K, relatively intense flare events occurred at rates of ~ 2 per min. Rapid increase in photon emission and electron displacement current were observed, with long exponential decay times > 1 min. We propose that the source of the flares is the interactions of high energy muons—of cosmic ray origin—with the highly-charged insulating components of the composite materials, which trigger avalanche electrostatic discharge and subsequent recharging along with concomitant light emission. We review evidence from the insulator conductivity at low temperatures, the rates and magnitude of surface charging, the flare frequency, and the magnitude and time-dependence of currents and light emission with regard to this muon hypothesis. Finally, a muon coincidence detection experiment using scintillation detectors is proposed to investigate the potential correlation between incident muons and the observed flares.