

DPP13-2013-001146

Abstract for an Invited Paper
for the DPP13 Meeting of
the American Physical Society

Gamma-ray Flares in the Crab Nebula: A Case of Relativistic Reconnection?¹

BENOIT CERUTTI, University of Colorado

The Crab Nebula was formed after the collapse of a massive star about a thousand years ago, leaving behind a pulsar that inflates a bubble of ultra-relativistic electron-positron pairs permeated with magnetic field. The observation of brief but bright flares of energetic gamma rays suggests that pairs are accelerated to PeV energies within a few days; such rapid acceleration cannot be driven by shocks. In this talk, I will argue that the flares may be the smoking gun of magnetic dissipation in the Nebula. Using 2D and 3D particle-in-cell simulations, I will show that the observations are consistent with relativistic magnetic reconnection, where pairs are subject to strong radiative cooling. The Crab flares may highlight the importance of magnetic reconnection in astrophysical sources.

¹This work was supported by the U.S. Dept. of Energy.