DPP09-2009-000982

Abstract for an Invited Paper
for the DPP09 Meeting of
the American Physical Society

Applied Spectroscopy in Pulsed Power Plasmas[1]

GREGORY ROCHAU, Sandia National Laboratories

Applied spectroscopy is a powerful diagnostic tool for high energy density plasmas produced with modern pulsed power facilities. These facilities create unique plasma environments with a broad range of electron densities (10^{13} – 10^{23} cm^{-3}) and temperatures (10^{0} – 10^{3} eV) immersed in strong magnetic (up to 10 T) and electric (up to 1 GV/m) fields. This paper surveys the application of plasma spectroscopy to diagnose a variety of plasma conditions generated by pulsed power sources including: magnetic field penetration into plasma, measuring the spatial distribution of 1 GV/m electric-fields, opacity measurements at stellar interior conditions, characteristics of a radiating shock propagating at 330 km/s, and determination of plasma conditions in imploded capsule cores at ∼150 Mbar pressures. These applications provide insight into fundamental properties of nature in addition to their importance for addressing challenging pulsed power science problems.

[1]Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under contract DE-AC04-94AL85000.