

Microwave and sub-mm radiation from energetic ion secondary particles

Jordi Tuneu, Sérgio Szpigel, Guillermo Giménez de Castro, Alexander MacKinnon

Abstract

Processes associated with solar flares sometimes accelerate ions into the GeV energy range. Such ions may produce secondary electrons and positrons whose synchrotron radiation may provide a new window on the most energetic ions in flares. We use the general-purpose Monte Carlo code FLUKA to predict the populations of secondary electrons and positrons found in the corona as a result of pion decay and other secondary-producing reactions. A variety of assumptions regarding ion energy and angular distributions are invoked. We calculate the synchrotron radiation in the microwave and sub-mm ranges resulting from these electrons and positrons and discuss how observations may constrain the location and nature of the flare particle accelerator. We consider in particular the likelihood of useful observations with leading edge facilities like ALMA and LLAMA