MAS20-2020-000157

Abstract for an Invited Paper
for the MAS20 Meeting of
the American Physical Society

Exploring Electron Energy Distribution in the SEP-associated Radio CME of 2012 July 17

SAMUEL TUN BELTRAN, United States Naval Research Laboratory

We present the modeling of the possible gyrosynchrotron (GS) emission from the CME associated with SEP event that started on 2012 July 17 17:15UT. We find that the legs of an erupting CME responsible for this SEP event appear bright in 150 MHz to 450 MHz radio images from Nancay Radio Heliograph. Upon further inspection, we find that some of the spatially-resolved radio spectra along these legs show characteristic shapes of GS emission from nonthermal electrons. We use 3D magnetic field model produced by thermodynamic MHD code, Magnetohydrodynamics Around a Sphere (MAS), place nonthermal electron population at where the GS emission is observed within the erupting CME geometry, and forward-fit the observed GS emission by performing the numerical calculation of GS emission and solving the radiative transfer equation along the line-of-sight. As a result, we obtain the spatial and energy distribution of nonthermal electrons in an erupting CME. We constrain the model by using white-light observation of the CME which can be used to estimate the plasma density distribution within the CME. We discuss the implication of the nonthermal electron distribution in terms of their acceleration mechanism during a CME eruption, and further explore their role as SEP seed particles by extending the modeling dynamically to pre-eruption time.