

What hard X-ray and γ -ray spectra tell us about magnetic field in reconnecting current sheets?

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We investigate electron and proton acceleration by a super-Dreicer electric field in a non-neutral reconnecting current sheet (RCS) with a variable plasma density. The tangential B_z and transverse magnetic field components B_x are assumed to vary with distances x and z from the X nullpoint linearly and exponentially, respectively; the longitudinal component (a 'guiding field') is accepted constant. Particles are found to gain a bulk of their energy in a thin region close to the X nullpoint where the RCS density increases with z exponentially with the index λ and the tangential magnetic field B_x also increases with z exponentially with the index α . We show that the spectral indices of accelerated particles γ are dependent on the indices of transversal field variations α and density variations λ leading a wide variety (1.5-10) of particle spectral indices observed in hard X-rays and γ -rays. This can be a good diagnostic tool for investigation of an RCS dynamics from the accelerated particle spectra.