

Abstract Submitted
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Explosive reconnection and particle acceleration in relativistic plasmas MAXIM LYUTIKOV, Purdue University, SERGEY KOMISSAROV, Leeds University, OLIVER PORTH, Goethe-Universitat, Frankfurt am Main, LORENZO SIRONI, Columbia University — We develop a model of particle acceleration in explosive reconnection events in relativistic magnetically-dominated plasmas. We identify two stages of particle acceleration: (i) fast explosive prompt X-point collapse and (ii) ensuing island merger. The fastest acceleration occurs during the initial catastrophic X-point collapse, with the reconnection electric field of the order of the magnetic field. During the X-point collapse particles are accelerated by charge-starved electric fields, which can reach (and even exceed) values of the local magnetic field. The explosive stage of reconnection produces non-thermal power-law tails with slopes that depend on the average magnetization σ . The model has all the ingredients needed for Crab flares: natural formation of highly magnetized regions, explosive dynamics on light travel time, development of high electric fields on macroscopic scales and acceleration of particles to energies well exceeding the average magnetic energy per particle.

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