Particle acceleration at 3D reconnecting magnetic separators

James Threlfall, Thomas Neukirch, Clare Parnell, and Julie Stevenson

University of St Andrews, Mathematical Institute, Department of Mathematics and Statistics, St Andrews, United Kingdom (jwt9@st-andrews.ac.uk)

We present results of test particle orbit calculations in three different environments which model separator reconnection in three dimensions. The test particle (electron and proton) orbits are calculated using the relativistic guiding centre approximation. We investigate test particle orbits in a time-dependent (analytical) electro-magnetic field configuration [detailed in Threlfall et al. (A&A, in press); arXiv:1410.6465]. These results are also compared with orbits based upon large-scale 3D MHD simulations of both a single reconnecting magnetic separator and an observationally driven 3D model of a solar active region which contains several topological features of interest, including separators.

We discuss how the test-particle orbits and the energy gain depend on the initial conditions, and how observations (for example, of solar flares) may be used to constrain model parameters.