



## **Cluster/RAPID high energy particle observations within non-force-free flux ropes in the plasma sheet**

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Separation distances of 0.1 Re or greater between the Cluster spacecraft provide a unique opportunity to probe the 3-dimensional geometry of flux ropes in the magnetotail. Applying a non-force-free, multispacecraft flux rope model to simultaneously invert magnetic field data from the Cluster fleet, we obtain the magnetic geometry and current densities of observed flux ropes in the near-Earth tail. We compare the model current densities to those from the curlometer calculations and find the model reproduces the overall magnitude and structure of non-force-free flux ropes in the tail. Probing Cluster/RAPID energetic electron and ion composition in the rope vicinity, including times when burst mode and pitch angle distributions are available, reveals a relationship between the 3-D geometry of the flux rope and injection signatures of high energy particles in the surrounding plasma environment. We interpret this relationship in terms of the reconnection region and discuss flux rope current closure in the ionosphere and solar wind.