Geophysical Research Abstracts
Vol. 14, EGU2012-7327, 2012
EGU General Assembly 2012

Superdiffusive propagation is space plasmas: numerical simulations and experimental evidences

G. Zimbardo and S. Perri
Dipartimento di Fisica, Universita' della Calabria, Rende, Italia

The transport of particles in magnetized plasmas can be described either by normal diffusion or by anomalous diffusion regimes in which the mean square deviation grows nonlinearly with time, comprising subdiffusion and superdiffusion. The propagation of energetic particles in space plasmas in the presence of magnetic turbulence is studied by numerical simulations, and it is shown that both superdiffusive and subdiffusive regimes can be found. The statistical description of these regimes in terms of Levy random walk will be addressed, emphasazing the importance of power law distributions for the particle free paths. In this talk we will also present results of spacecraft data analysis, and in particular the probability distribution functions of pitch angle scattering times, which support the superdiffusive propagation of energetic particles in the solar wind. The influence of superdiffusion on the processes of energetic particle acceleration will be also discussed.