Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Pinch effect and chaotic motion in toroidal confinement devices G. SPIZZO, Consorzio RFX, Padova - Italy, R.B. WHITE, Plasma Physics Laboratory, P.O.Box 451, Princeton, NJ 08543, S. CAPPELLO, Consorzio RFX, Padova - Italy
— Particle transport in a toroidal plasma confinement device can be non-diffusive when magnetic chaos is present but the system is not too far above the stochastic threshold. In some conditions a phenomenological fit to density and impurity profiles gives a diffusion coefficient and also a pinch effect[1]. We show that the combination of diffusion and pinch is an expression of the subdiffusive and nonlocal nature of the transport, brought about by the existence of a spectrum of long distance Lévy flights. The effect is illustrated by numerical modelling of magnetic structure and particle transport in conditions relevant for the reversed-field pinch experiment at the Consorzio RFX. Simulations consist of guiding center calculations of particle motion in the spectrum of MHD modes given by the 3D code SpeCyl[2], and in integration of the Montroll equation[3] with a kernel derived from the simulations, distinguishing between trapped and passing particles. Results are relevant for other systems with chaos induced transport, e.g. electron transport in Tokamaks.

[1]X. Garbet, Phys. Rev. Lett. **91**, 035001 (2003), and references therein.
[2]S.Cappello and D.Biskamp, Nucl. Fusion **36**, 571 (1996).
[3]V.M.Kenkre and E.W.Montroll, J. Stat. Physics **9**, 45 (1973).

Gianluca Spizzo
Consorzio RFX, Padova, Italy

Date submitted: 22 Jul 2007 Electronic form version 1.4