

# Plasma Focus as Tool for Experimental Study of Spontaneous and Fast Reconnection

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In this presentation we report the evolution of the plasma column formed in the plasma focus PF-1000 facility in Warsaw, Poland at the 2 MA current and deuterium filling, where fusion D-D reaction produces neutron yield above  $10^{11}$  per one shot [1]. As diagnostic tools we used interferometry and time resolved x-ray and neutron detectors. 16 interferograms taken in one shot showed the existence of spherical-like, toroidal, helical or collar structures in the range of a few cm dimension, electron density of  $(10^{17} \text{ cm}^{-3} - 10^{20}) \text{ cm}^{-3}$  and magnetic field of (10 – 100) T [2]. These self-organized structures confirm the existence of internal closed currents and magnetic fields [3]. Some of these structures are relative stable for tens and hundreds ns. We can distinguish two kinds of transformation. The first one at the time of acceleration of the fast electrons and deuterons with the energy of hundreds keV are connected with fast reconnection. The second kind of transformations at the other times is characterized by Alfvén velocity (about  $10^7 \text{ cm/s}$ ). It is quantitative described by spontaneous reconnection. In interferograms we can recognize separatrix lines.

## References

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