



OTTO VON GUERICKE  
UNIVERSITÄT  
MAGDEBURG

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NATURWISSENSCHAFTEN

# Seminar über Nichtlinearität und Unordnung in komplexen Systemen

Am Montag, dem **07. Mai 2018**, um 16:15 Uhr im Gebäude 16, Raum 154 (ehemals Bibliothek), findet der Vortrag von

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statt.

**Vortragsthema: Rheological properties of a ferromagnetic nematic liquid crystal**

## Abstract:

Ferromagnetism is a phenomenon well known in solids. An old idea to generate a liquid ferromagnet was that by introduction of ferromagnetic nanoparticles one could induce a ferromagnetic liquid crystal phase [1]. This phase was recently successfully experimentally realized [2]. Compared to the usual nematic liquid crystal, this system has an additional order parameter of magnetization, the presence of which has interesting consequences on the dynamic behavior of the system [3].

I will first present the statics and the macroscopic dynamics of this system. I will then discuss the rheological properties, focusing first on the effective viscosity that one could measure in a simple shear geometry. It is found that the viscosity can be increased by a factor of two using low magnetic fields of order 10 mT [4]. Finally I will analyze the analogues of the so called Miesowicz viscosities in a usual nematic liquid crystal. I will show that not only are the viscosities different than those in a usual nematic liquid crystal, but that there are also more possible combinations relative to the velocity field and the shear plane.

[1] F. Brochard and P.G. de Gennes, *J. Phys. (France)* **31**, 691 (1970).

[2] A. Mertelj, D. Lisjak, M. Drofenik, and M. Čopič, *Nature* **504**, 237 (2013).

[3] E. Jarkova, H. Pleiner, H.-W. Müller, and H.R. Brand, *J. Chem. Phys.* **118**, 2422 (2003).

[4] T. Potisk, H. Pleiner, D. Svenšek, and H.R. Brand, *Phys. Rev. E* **97**, 042705 (2018).

Interessenten sind herzlich eingeladen!

Magdeburg, den 07. Mai 2018

gez. apl. Prof. Dr. A. Eremin