

Physikalisches Kolloquium

Magnetic Fluids

Prof. Kevin O'Grady
University of York

Due to the nature of the exchange interaction there are no intrinsically strong magnetic liquids but solutions of paramagnetic salts where an ion has a large moment can exhibit macroscopic behaviour in a magnetic field gradient. Such materials have no real practical applications. Generally magnetic fluids are mixtures or colloids of strong magnetic materials such as ferrites or even metals dispersed in a range of liquids. Such materials have been under development from as long ago as the 1950's but in particular truly stable colloidal dispersions were developed for application by NASA in the 1960's and are known as ferrofluids. These materials have very high monetary values and are used in a wide range of applications from the production of rotating vacuum seals on large scale coating machines, magnetic separation of scrap materials and loudspeakers and inclinometers. Such materials are relatively economic for use.

A separate class of magnetic materials are mixtures of large particles which are thus not colloidally stable but find application in a thixotropic form in damping systems recently including a widespread use in road wheel dampers and engine mountings in cars. In such materials the change of rheology is dramatic.

A further recent area of significant interest relates to the fact that under high frequency AC fields ferrofluids are found to exhibit a heating effect known as magnetic hyperthermia and have potential for use in biomedical applications and in particular the reduction in size of tumours within the human body. Human trials of such potential therapies have recently started.

In this seminar the structure and properties of such materials will not only be described but will be demonstrated experimentally. Because of the unusual property that a magnetic fluid can experience a force additional to gravitation or a mechanical impulse, very unusual phenomena are found to occur particularly in ferrofluids. These phenomena will be demonstrated including the opportunity for the audience to generate and examine the phenomena themselves hands-on.

Der Gast wird betreut von Herrn Prof. Dr. Hillebrands

Gäste sind herzlich willkommen

Kaffeeauschank ab 17:00 Uhr

Montag, 28.05.2018, 17:15 Uhr

Gebäude 46, Hörsaal 270