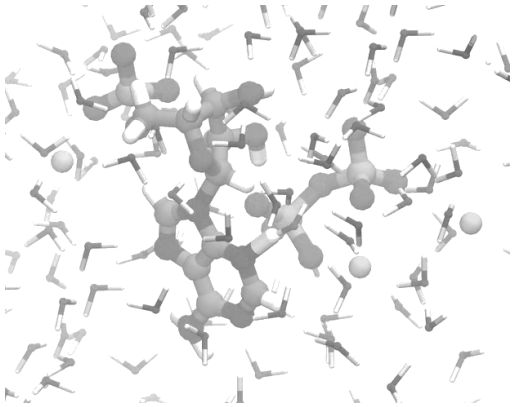
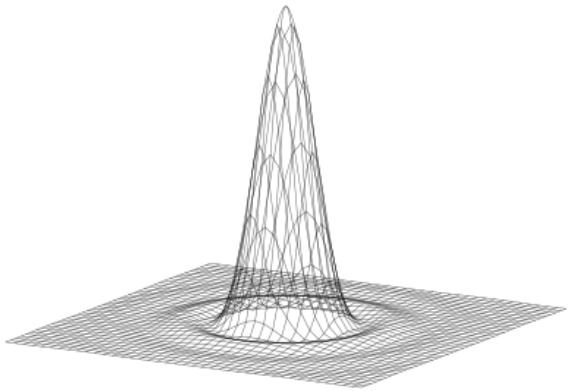
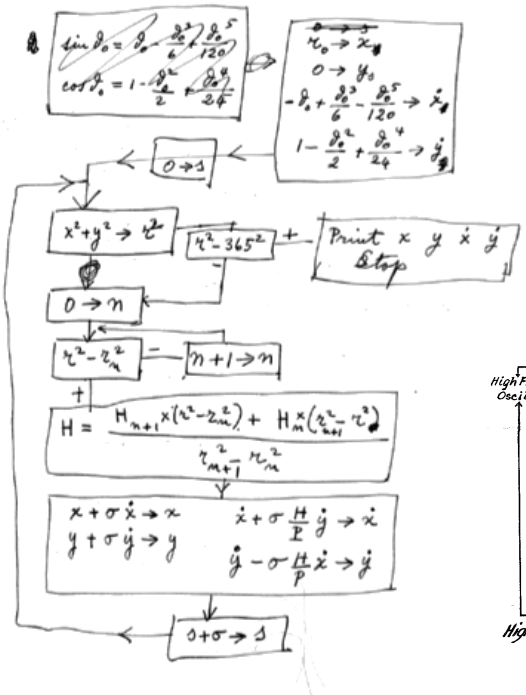
The XXIXth IUPAP Conference on Computational Physics

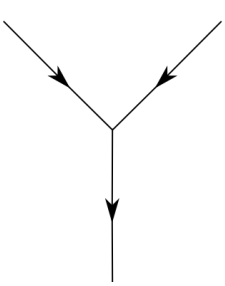
CCP2017

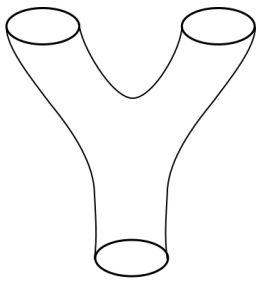
Book of abstracts

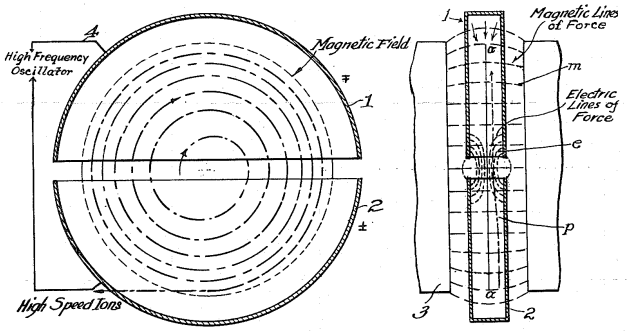












Paris, 9-13 July 2017

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P32: Mean squared displacement of dust particles in 2-dimensional strongly coupled Yukawa liquids exposed to an external magnetic field

Ranna Masheyeva * [1], Karlygash Dzhumagulova [1], Tlekkabul Ramazanov [1], Zoltan Donkó [2], Peter Hartmann [2]

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[2] Wigner Research Centre of the Hungarian Academy of Sciences – Hungary

In various physical settings complex plasmas are affected by external electric and magnetic fields. In particular, the influence of magnetic fields on strongly coupled dusty plasmas became an important topic in the last few years [1,2].
The purpose of this work is to investigate the mean squared displacement of the dust particles exposed to a static homogeneous external magnetic field, under the effect of friction due to the presence of a neutral background gas. Computer simulations of the motion of the dust particles, interacting via a Yukawa potential (characterized by a screening parameter κ), have been carried out based on the Langevin equation of motion, which takes into account the influence of buffer gas/plasma environment on the dust particles' dynamics. The robust second-order Velocity-Verlet propagation scheme [3], obtained with taking into account an external magnetic field and background gas, was used in order to solve the equations of motion of the particles. The mean squared displacements of the particles were investigated in the wide region of the four dimensionless parameters: the coupling parameter, the screening parameter, the magnetic field strength expressed as the ratio of the cyclotron to plasma frequency, and the friction coefficient.

[1] P. Hartmann, Z. Donkó, T. Ott, H. K$'$ahlert, and M. Bonitz, Phys. Rev. Lett., 2013, 111, 155002
[2] M. Bonitz, Z. Donkó, T. Ott, H. K$'$ahlert, and P. Hartmann, Phys. Rev. Lett., 2010, 105, 055002
[3] K. N. Dzhumagulova, T.S. Ramazanov, 28th IUPAP Conference on Computational Physics, South Africa, 2016, P. 56.

*Speaker