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Il Nuovo Saggiatore

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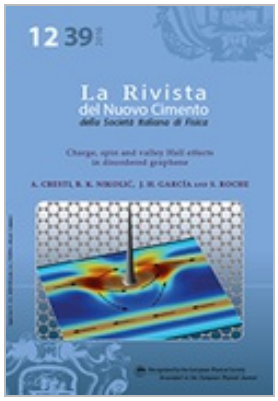
Il Nuovo Cimento, Vol. 39, N. 3 (2016)

Papers presented at the International Workshop "The Structure and Dynamics of Supercooled Water and Other Glassy Materials", SWGM 2015, Palermo 10-13 October 2015, edited by P. Baglioni, A. Cupane and F. Mallamace.
This issue is dedicated to Professor Sow-Hsin Chen, on the occasion of his 80th birthday, to celebrate a world-wide leader of experimental physics in complex materials. The issue contains contributions related to supercooled gass-forming liquids and water in particular.

La Rivista del Nuovo Cimento, Vol. 39, N. 12 (2016)
Charge, spin and valley Hall effects in disordered graphene



A. Cresti, B. K. Nikolić, J. H. Garcia, S. Roche
The discovery of the integer quantum Hall effect in the early eighties of the last century, with highly precise quantization values for the Hall conductance in multiples of e^2/h, has been the first fascinating manifestation of the topological state of matter driven by magnetic field and disorder, and related to the formation of non-dissipative current flow. Recently, the Zeeman spin Hall effect and the formation of valley Hall topological currents have been introduced for graphene-based systems, under time-reversal or inversion symmetry-breaking conditions, respectively. This review presents a

comprehensive coverage of all these Hall effects in disordered graphene from the perspective of numerical simulations of quantum transport in two-dimensional bulk systems (by means of the Kubo formalism) and multitherminal nanostructures (by means of the Landauer-Böttiker scattering and non-equilibrium Green's function approaches).

EPJ E – Highlights

Towards the observation of a liquid-liquid phase transition in patchy origami tetrahedra: a numerical study

S. Ciarella, O. Gang, F. Sciortino

Did you know that water can still remain liquid below zero degrees Celsius? It is called supercooled water and is present in refrigerators. At even smaller temperatures, supercooled water could exist as a cocktail of two distinct liquids. Unfortunately, the presence of ice often prevents us from observing this phenomenon. So physicists had the idea of replicating the tetrahedral shape of water molecules - using DNA as a scaffold to create tetrahedral molecules - and thus removing the interference of ice formation. This approach allowed Simone Ciarella from the University of Rome, Italy, and his colleagues to confirm that, in theory, a dual liquid phase is possible in sub-zero water and any other liquids made of tetrahedral molecules. These results have been published in EPJ E. It is a great tale of how the underlying microscopic shape determines the overall macroscopic form.

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