TO THE PROBLEM OF THE INTRINSIC MAGNETISM IN CARBON-BASED SYSTEMS[1]

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The development of experimental techniques over the recent years opened the possibility for synthesis and investigations of a wide class of new substances with unusual combination of properties. As a rule, magnetic materials can be metals, semiconductors or insulators which contain the ions of transition metals or RE-metals with unfilled shells. During the last decade the search for macroscopic magnetic ordering in exotic materials has attracted big attention. In particular, the carbon-based materials were pushed into the first row of researches. Carbon materials are unique in many ways. They are characterized by the various allotropic forms that carbon materials can assume, including the graphene - a monolayer of carbon atoms densely packed in a honeycomb lattice. It was conjectured that in addition to its transport properties a rich variety of magnetic behavior may be expected in graphene, including even a kind of intrinsic ferromagnetism. Some hypothesis were claimed that connected possible spin-ordering effects with the low-dimensionality and Dirac-like electron spectrum of graphene, thus inspiring a new kind of magnetism without magnetic ions [1]. In the present study, these questions were analyzed and critically reconsidered to elucidate the possible relevant mechanism (if any) which may be responsible for observed peculiarities of the ”magnetic” behaviour in these systems, in the approach of quantum theory of magnetism [2, 3]. On the basis of this analysis the conclusion was made that the thorough and detailed experimental studies of this problem only may lead us to a better understanding of the very complicated problem of magnetism of carbon-based materials.

References

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