FMR evidence of stable ferromagnetic correlations at zigzag edge states in graphene

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According to theoretical predictions spins on the zig-zag edge of a graphene ribbons and flakes should interact ferromagnetically. But the edge magnetism is hardly observed. We have studied this problem experimentally, searching for the ferromagnetic resonance (FMR) signal associated with the correlated edge spins. We found such signal in the sample of a single layer graphene in a high vacuum. It showed very unusual temperature dependence of intensity. Very strong FMR signal, found in the freshly prepared samples of multilayer graphene and nanographite in vacuum, disappeared in several hours, presumably due to weak antiferromagnetic coupling between graphene layers. Recently we have found that for composite of paraffin and graphene flakes the FMR signal is stable in time and its temperature dependences of the intensity and positions is similar to that observed for the pristine graphene and can be interpreted in the frame of 1D-ferromagnetism.