^{4}He clusters adsorbed on graphene

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We report the results of the study of ^4He_N clusters adsorbed on one and both sides of a graphene sheet. Interactions of ^{4}He clusters with graphene are modelled using an averaged helium-carbon potential that depends only on the distance to the graphene sheet, and a potential constructed as a sum of individual helium-carbon interactions. That way, we assess the effect of corrugation on the binding properties of helium clusters. All the calculations have been performed using quantum Monte Carlo methods. At zero temperature the ground-state properties of ^4He_N for $2 \leq N \leq 50$ have been determined using variational and diffusion Monte Carlo calculations. We find that clusters adsorbed on both sides of graphene are correlated. In addition, we observe the changes in the size of the clusters. For selected larger clusters, calculations have been performed also at finite temperature by path integral Monte Carlo simulations.