Amplification of the diamagnetic response in small Hubbard rings

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In this presentation, we study the magnetic properties of electrons in small discrete rings with $3 \leq N \leq 6$ sites and $N_e = N$ electrons, which can be regarded as a simplified version of real aromatic molecules. In particular, the ring with six sites and six electrons is our prototype of the benzene molecule. Aiming at that goal we employ the Hubbard model with appropriate parameters t and U, and confirm it cannot account for the anisotropy of the diamagnetic susceptibility of some aromatic molecules, which is observed when they are subjected to an external magnetic field perpendicular to their basal plane. Benzene is a standard example of that. Therefore, we propose an extension of the Hubbard model with an extra interelectronic momentum-momentum coupling which is an effective two-body interaction between the itinerant electrons mediated by virtual transitions of the binding electrons of our pseudo molecules. Our results show that this extension of the Hubbard model is able to cause an enhancement of the anisotropic diamagnetic susceptibility in some specific cases.