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Book of abstracts

BOND ORDER WAVE IN 1D DIPOLAR FERMIONS

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The recent experimental realization of a quantum degenerate dipolar Fermi gas of Dysprosium, and the progress in trapping and cooling of dipolar molecules have opened the path towards ultracold quantum gases with dominant dipole interactions. In this study, we investigate the effect of dipolar interactions in commensurate one-dimensional systems in connection with the possibility of observing exotic many-body effects with trapped atomic and molecular dipolar gases. By combining analytical and numerical methods, we show how the competition between short- and long-range interactions, together with the anisotropic nature of the dipolar interaction, gives rise to frustrating effects which lead to the stabilization of spontaneously dimerized phases characterized by a bond-ordering (BOW) in both purely one dimensional and quasi-1D setups.

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ELECTROMAGNETIC FIELD FLUCTUATIONS NEAR A DIELECTRIC HALF-SPACE AND APPEARANCE OF SURFACE DIVERGENCES IN THE IDEAL CONDUCTOR LIMIT

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The electromagnetic field fluctuations in the vacuum state are considered in the region external to a half-space filled with a homogeneous non-dissipative dielectric. We discuss the appropriate limits to a real and an ideal metal, focusing on the renormalized field fluctuations (equivalent to the energy densities) in the proximity of the dielectric-vacuum interface.
We show that, whereas in presence of a real conductor the renormalized field fluctuations are finite in any point of space, surface divergences at the interface arise in the ideal conductor limit. The main features of such divergences are discussed in detail. We point out that the bahavior of field fluctuations close to the interface can be investigated through the retarded Casimir-Polder interaction with an appropriate polarizable body.

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