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Ultracold dipolar gases – challenge for Experiments and Theory

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Recent experimental progress in trapping and cooling of molecular gases boosts an interest to the interdisciplinary field of quantum gases with dominant dipole-dipole interactions. An unprecedented level of experimental control together with specific physical properties of the dipole-dipole interaction provides a unique possibility to find new physical phenomena and practical applications. In this talk, recent achievements in studies of ultracold dipolar gases, both fermionic and bosonic, are presented. We focus our attention on many-body properties of such systems and discuss how the characteristic features of the dipole-dipole interaction: long range and anisotropy, affect their collective behavior and result in novel macroscopic quantum phenomena.