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## Dipolar condensed atomic mixtures and miscibility under rotation

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By considering symmetric and asymmetric dipolar coupled mixtures (with dysprosium, erbium and rubidium isotopes), we report a study on relevant anisotropic effects, related to spatial separation and miscibility, due to dipole-dipole interactions (DDI) in rotating binary dipolar mixtures Bose-Einstein condensates [1]. The binary mixtures are kept in strong pancake-shaped trap, with repulsive two-body interactions modeled by an effective two-dimensional coupled Gross-Pitaevskii equation. The DDI are tuned from repulsive to attractive by varying the dipole polarization angle. A clear spatial separation is verified in the densities for attractive DDI, being angular for symmetric mixtures and radial for asymmetric ones. Another relevant outcome is the observed mass-imbalance sensibility verified by the vortex-pattern binary distributions in symmetric and asymmetric-dipolar mixtures, which requires the use of a relation for nonhomogeneous mixtures to estimate the miscibility of two components.

References:

- [1] R.K. Kumar, L. Tomio and A. Gammal, Spatial separation of rotating binary Bose-Einstein condensates by tuning the dipolar interactions, *Phys. Rev. A* **99**, 043606 (2019); *id.*, Vortex patterns in rotating dipolar Bose-Einstein condensate mixtures with squared optical lattices, *J. Phys. B* **52**, 025302 (2018); R.K. Kumar, L. Tomio, B.A. Malomed and A. Gammal, Vortex lattices in binary Bose-Einstein condensates with dipole-dipole interactions, *Phys. Rev. A* **96**, 063624 (2017).

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