New frontiers in quantum simulation and sensing with dipolar arrays

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Recent experimental developments on cooling, trapping, and manipulating ultra-cold dipolar gases are opening a door for the controllable study of their complex many-body quantum dynamics. In particular, by encoding a spin degree of freedom in rotational levels in polar molecules it is now possible to use these systems to emulate a variety of rich spin models exhibiting long range and anisotropic interactions. In this talk, I will discuss theoretical and experimental progress [1,5] towards engineering quantum spin models relevant for quantum simulation and sensing in molecule arrays trapped in 3D optical lattices or optical twezers.

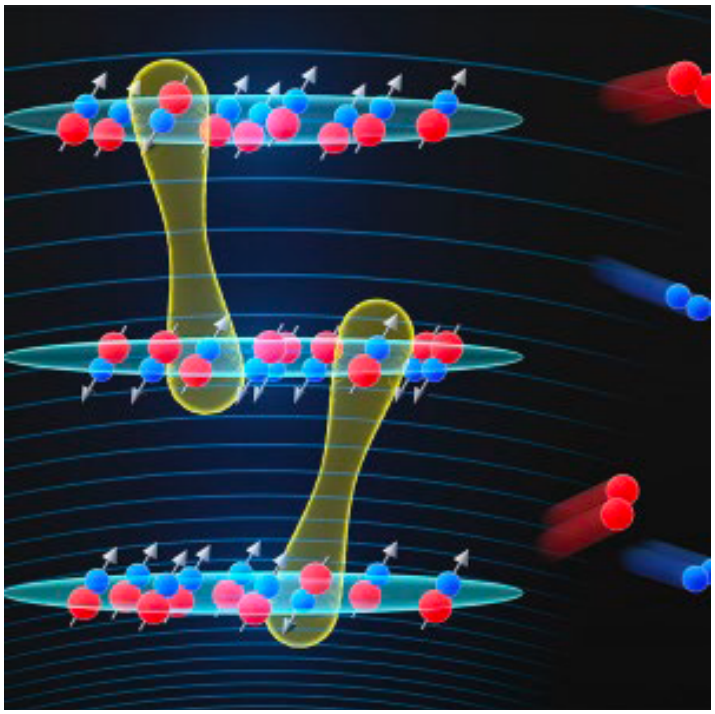

Figure 1: KRb molecules loaded in multilayers.

References

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