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The effect of anisotropy of dipolar hopping on localization in three-dimensional lattices[1] JOSHUA T CANTIN, Univ of British Columbia, TIANRUI XU, Univ of California, Berkeley, ROMAN V KREMS, Univ of British Columbia — It has become widely accepted that particles with long-range hopping do not undergo Anderson localization. However, several recent studies demonstrated localization of particles with long-range hopping. In particular, it was recently shown that the effect of long-range hopping in 1D lattices can be mitigated by cooperative shielding, which makes the system behave effectively as one with short-range hopping. Here, we show that cooperative shielding, demonstrated previously for 1D lattices, extends to 3D lattices with *isotropic* long-range r^{-3} hopping, but not to 3D lattices with dipolar *anisotropic* hopping. Since cooperative shielding enables localization, our results suggest (though do not prove) that localization in 3D lattices is possible for particles with isotropic long-range hopping, but not anisotropic long-range hopping. We show that the anisotropy of the dipolar long-range hopping qualitatively changes the energy level statistics, the scaling with the lattice size and the diffusion dynamics of wave packets in disordered 3D lattices.

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Joshua Cantin
Univ of British Columbia

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