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**Quantum paramagnetism in dipolar Heisenberg models** AHMET KELES, ERHAI ZHAO, George Mason Univ — We present the theoretical phase diagrams for two dimensional spin one-half Heisenberg models with long range, anisotropic dipole-dipole interactions motivated by recent experiments on ultracold polar molecules in optical lattices. We consider localized dipolar molecules aligned along the direction of external electric field, and analyze the competing instabilities towards long range orders using non-perturbative functional renormalization group theory. We identify three long range ordered phases, the antiferromagnetic Nel, the stripe and the spiral phases. Surprisingly, we also find a wide region of the parameter space where strong quantum fluctuations lead to paramagnetic behavior down to lowest numerical renormalization scales. Our findings provide further evidence that ultracold dipolar gases constitute a promising route to emulate frustrated quantum magnetism and search for quantum spin liquids.

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