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Control of anisotropic interactions with microwaves in ultracold NaK molecules ZOE YAN, HUANQIAN LOH, JEE WOO PARK, SEBASTIAN WILL, MARTIN ZWIERLEIN, Massachusetts Inst of Tech-MIT — Ultracold polar molecules offer long range anisotropic interactions, which can provide access to novel phases of condensed matter physics. The recent creation of fermionic NaK polar molecules in the ground hyperfine-rovibronic state, which is chemically stable, demonstrates an important step towards the study of new dipolar physics. To engineer dipolar interactions between molecules with large electric dipole moments, one can apply microwaves to mix the lowest and first excited rotational states. Hyperfine interaction in the first excited rotational state mixes nuclear spin and rotation, leading to states with rich character, which we map out by performing microwave spectroscopy. The admixed hyperfine character serves as a tool to engineer wide ranges of "magic" trap polarization angles, at which the lowest and first excited rotational states have matching polarizabilities. Finally, we demonstrate that we can access large dipole moments by coherently dressing the molecules with microwaves.

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