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Realization of Multi-Level Magic Conditions in Polar Molecules for Quantum Simulations[1] QINGZE GUAN, MING LI, SVETLANA KOTOCHIGOVA, Temple Univ — Cold and ultracold molecules provide an ideal platform for realizing quantum computing and simulating condense matter systems. Taking advantage of the long-range dipole-dipole interactions, the rotational degrees of freedom of cold molecules trapped in optical lattice can be utilized to either simulate correlated many-body systems or construct entangled quantum qubits.To realize these systems, careful control of molecule-laser interactions for different rotational states is necessary. In this work, we theoretically study the dynamic polarizabilities of $^{87}Rb^{133}Cs$ molecule near the $b^3\Pi_0$ transition and explore its relevance in different quantum simulation scenarios. On the one hand, we find a frequency domain where a near "triple magic" condition exists among three rotational states which will enable to construct a synthetic lattice dimension with rotational excitations [1]. On the other hand, we study the periodic driving of the light shifts below and above the resonance for different rotational states which can be used for Floque engineering to mimic Hopf insulator [2]. [1] B. Sundar, B. Gadway, and K. Hazzard, Scientific Reports, 8:3422 (2018). [2] T. Schuster, F. Flicker, M. Li, S. Kotochigova, J. Moore, J. Ye, and N. Yao, arXiv:1901.08597.

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