# Controllability of a rotating asymmetric molecule

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In this talk we present the symmetries and an approximate controllability result for the quantum rotational dynamics of an asymmetric top molecule, driven by three orthogonal control fields. More in detail, we show the approximate controllability (and stronger properties) of the associated Schrödinger partial differential equation for almost every value of the Wang asymmetry parameter $b$, with the exception of some critical configurations of the electric dipole. The proof is based on a degenerate analytic perturbation (in the asymmetry parameter $b$) from an associated approximately controllable symmetric top. Moreover, we also show that the critical configurations of the electric dipole, that correspond to non-controllable cases of the associated symmetric top, are non-controllable neither for the asymmetric top. This study is a continuation of a previous paper on the controllability of a rotating symmetric molecule [1].

[1] U. Boscain, E. Pozzoli, M. Sigalotti. *Classical and quantum controllability of a rotating symmetric molecule.* SIAM J. Control Optim., **59(1)**, 156–184, 2021.

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