PRODUCTION AND LASER PHOTODETACHMENT OF THE FLUCTIONAL ANION METHIDE, CH_3^-

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Methide, CH_3^-, is isoelectronic with neutral ammonia, and is expected to exhibit an inversion vibration, analogous to the well-studied 24 GHz transition of ammonia. The tunnelling frequency is, of course, extremely sensitive to the details of the potential barrier. Because electron correlation effects are more pronounced in anions, methide is a good system for studying the effects of electron correlation on tunnelling. There have been a number of theoretical studies of methide [a], but few experimental studies [b], in part because its low electron affinity (0.08 eV) makes it a poor candidate for study in a discharge. In addition, there are technological problems in producing intense (nA) beams of methide. The safest precursor, methane, produces only very weak beams of methide. More intense beams of methide can be produced from diazomethane, which unfortunately has nontrivial safety concerns. We will present progress in the safe production of diazomethane, the production of intense beams of methide, and photodetachment of methide using a coaxial ion beam/laser beam spectrometer. [c]

[a] W. P. Kraemer et al., J. Mol. Spec. 147, 526 (1991).
[b] G. B. Ellison, P. C. Engelking, and W. C. Lineberger, J. Am. Chem. Soc. 100, 2556, (1978).
[c] Supported by DOE EPSCoR