MICROWAVE TRANSITIONS IN THE Na_3 GROUND STATE

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The $^2E'$ ground state of Na_3 is split by Jahn-Teller interaction. The state of lowest energy has $^2B_2$ electronic symmetry and the geometric shape of an isosceles triangle with an apex angle of 80 degrees. Correspondingly, the potential surface has three equivalent minima which are separated by barriers through which tunneling is possible. The Jahn-Teller distortion gives rise to a small electric dipole moment of the molecule along the a-axis.

Sodium trimers are produced in a molecular beam expansion along with an unknown size distribution of other sodium and sodium - rare gas aggregates. In order to unambiguously assign measured microwave absorption to the trimer, a mass selective detection scheme has to be used. In a spectroscopic set up with separated laser pump and probe regions, the population of a rotational ground state level is depleted and probed, respectively. A microwave field between the two regions induces a rotational transition. In the probe region, resonant two-photon ionization and mass selective detection of Na_3^+ are used to monitor the population change of the rotational level of interest.

First results on the $4_{14} - 3_{03}$ and $4_{04} - 3_{13}$ transitions are reported.