1. INTRODUCTION
Over the last 15 years, single molecule spectroscopy (SMS) has been established as a new tool in the ever expanding range of spectroscopic methods. SMS is especially useful to study inhomogeneous systems. Biological systems are by their nature highly heterogeneous and as such perfect targets for SMS. From this it is clear that, next to biological samples, polymers form a study object of SMS as polymers are very often heterogeneous in their behavior. Many theories that describe polymer properties are based on a microscopic picture that now can be evaluated experimentally by applying single molecule techniques. Especially the behavior close to the glass transition temperature of the polymer under consideration has drawn a lot of attention. In order to validate theories describing this transition, probe molecules are embedded in the polymer. Segmental relaxation above $T_g$ can be probed by the rotational motion, of a probe molecule, induced by the relaxation process. The rotation of single molecules is typically followed by measuring the degree and orientation of linear polarization of fluorescence, resulting from the projection of the emission dipole orientation on a two-dimensional plane. This usually leads to a loss of the out-of-plane information of the molecule under investigation.

2. RESULTS AND DISCUSSION
Several detection schemes were developed for measuring the 3D orientation of single molecules via the orientation of their transition dipole. Here we use defocused wide-field imaging in combination with an extremely robust perylenediimide dye to follow rotational motion of the dye in a polymer (poly(methyl methacrylate)) with a $T_g$ close to room temperature. Defocused imaging offers several advantages: it allows for highly parallel data collection by looking at many molecules in the field of view and it gives exact information on the 3D orientation as mentioned before. Furthermore the photostability of the dye used allows imaging for an extended period of time (more than 30 minutes). In this way, spatial and temporal inhomogeneities of the rotational movement of the dyes could be demonstrated. The high quality of the images allows for a decomposition of the movement in the x-y plane and the z-plane. We could demonstrate both static and temporal heterogeneity in polymer relaxation, in good agreement with previous literature reports. Furthermore, the full 3-D rotational diffusion can be analyzed using a model for an isotropic rotor. The detailed analysis suggests the existence of different relaxation regimes for the polymer used.