Our sense of smell is usually referred to as the least known among all our senses. Several theories have been proposed over the years trying to explain how we smell but none of them provide a comprehensive understanding of the fundamentals of olfaction. Detailed information on how the interactions between odorants and olfactory receptors occur at the molecular level is still lacking. To achieve a better understanding on the molecular mechanisms involved in olfaction, we are investigating several odorants and their interactions with water and mimics of amino acid residues in olfactory receptors using broadband rotational spectroscopy. In this talk we will present an overview of our recent work on odorants and their clusters. Our results provide information on the intra- and intermolecular interactions determining structure and conformation, and highlight the relevant role of secondary interactions.

Figure 1. Observed conformers of the fenchone–ethanol complex.