



## IMPRS UFAST Call for PhD applications 2021/2022

### Investigating chirality using microwave spectroscopy

M. Schnell-1



<b>Title of PhD Project</b>	<b>Investigating chirality using microwave spectroscopy</b>
<b>Type</b>	Experimental
<b>Supervisor(s)</b>	Prof. Melanie Schnell
<b>Affiliation(s):</b>	DESY / CAU Kiel
<b>Number of positions:</b>	1
<b>Abstract:</b>	<p>Most molecules of biochemical relevance are chiral. Even though the physical properties of two enantiomers are nearly identical, they can exhibit completely different biochemical effects, such as different odor in the case of carvone. It is an ongoing challenge to control and manipulate chirality, which can become useful for precision spectroscopy on chiral molecules or enantiomer-selective collision experiments.</p> <p>Recently, we demonstrated a new method of differentiating enantiomers of chiral molecules in the gas phase. It is based on broadband rotational spectroscopy, and it is a non-linear, coherent, and resonant three-wave mixing process that involves a closed cycle of three rotational transitions. The phase of the acquired signal bears the signature of the enantiomer, as it depends upon the product of the transition dipole moments. A unique advantage of our technique is that it can also be applied to mixtures of chiral molecules, even when the molecules are very similar. Furthermore, this technique also bears the potential for enantiomer separation, as was recently shown in experiments on enantiomer-selective population transfer. This avenue of research will be explored further in this PhD project.</p> <p>This PhD project will be part of the collaborative research program (collaborative research grant 1319) on “Extreme light sensing for chiral molecules, ELCH”, granted by the German Science Foundation. For this program, we are looking for a motivated PhD student with a strong physical chemistry/physics background. Knowledge in molecular spectroscopy, molecular physics, electronics, and vacuum technology is very much appreciated.</p>
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