The research group “Physico-Chemical Fundamentals of Combustion (PCFC)” under the direction of Prof. Dr.-Ing. K. Alexander Heufer is engaged in research and teaching on fundamental combustion chemistry and advanced diagnostics of combustion processes.

The goal is to deeply understand the underlying reaction mechanism of the combustion processes of conventional and novel transportation fuels towards clean and efficient combustion.

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Bachelor’s or Master’s Thesis

Start: As soon as possible

Fundamentals of the combustion of diisopropyl ketone (DIPK)

The will of decreasing CO₂ emissions in transportation sector brings the need of new fuels. The reduction of CO₂ emissions is achievable by the use of biofuels or high quality fuels that increase the performances of the engine. In spark-ignition engines, the fuel should resist autoignition in order to avoid the knock effect that lead to a reduction of the engine power and potentially damages the engine. Ketones can be produced from lignocellulosic biomass by catalytic processes and are known to be resistant to autoignition. Meeting both CO₂ reduction requirements, ketones are therefore good candidates and this study is supported by the Cluster of Excellence “The Fuel Science Center – Adaptive Conversion Systems for Renewable Energy and Carbon Sources” (FSC).

Diisopropyl ketone shows a promising potential. However, the fundamentals of the combustion of DIPK are barely known. The candidate’s task will be to get a deeper insight into the combustion behavior of DIPK through an experimental and kinetic modeling study.

Task:
- IDTs measurements in a shock tube and a rapid compression machine
- Develop and validate a detailed kinetic model

Requirements:
- Interest in chemical engineering
- Interest in applied and theoretical research
- Fluent English