Karlsruhe Institute of Technology

Tritium Laboratory Karlsruhe

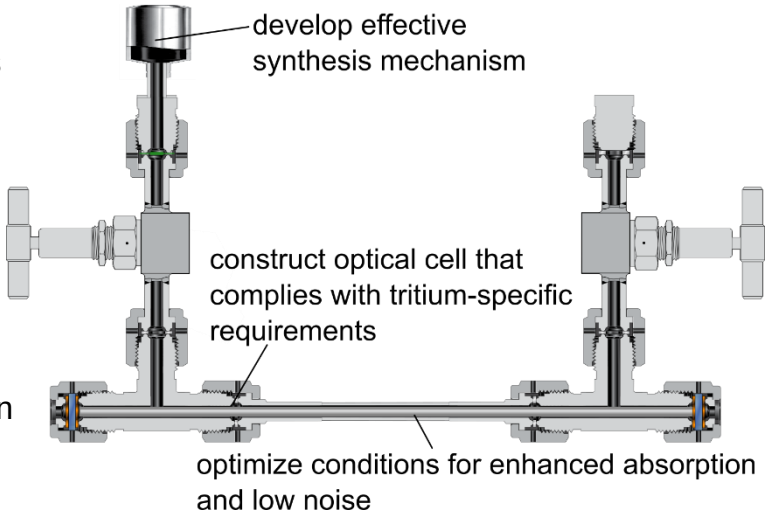
Precision spectroscopy of tritiated methane species

Motivation

Tritiated methane species are naturally created within tritium-handling facilities through interactions between the tritium and carbon atoms present in steel or remnants from vacuum vessels. Despite their significance, accurate spectroscopic data for these isotopologues are limited, hindering precise modelling and analysis.
This study employs FTIR spectroscopy to address this gap by providing high-precision measurements that (i) enhance the understanding of isotopic changes in the energies of molecules and (ii) enable the detection and quantification of tritiated species, a crucial requirement for fusion plant infrastructure.

Your task

- Develop an optical cell that complies with the requirements regarding the synthesis, optical properties, and tritium-compability.
- Measure spectra using FTIR-spectrometry.
- Calibrate the spectra using absorption signatures of precisely known species (e.g. CO_2, CH_4,…).
- Assign, yet not measured, absorption signatures from tritiated methane species using a dedicated and modifiable python-software.
- Analyse data and derive a quantum-mechanical model for the rotational and vibrational states of tritiated methane species.



Be co-author of an impactful publication for molecular physics and fusion technology!

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