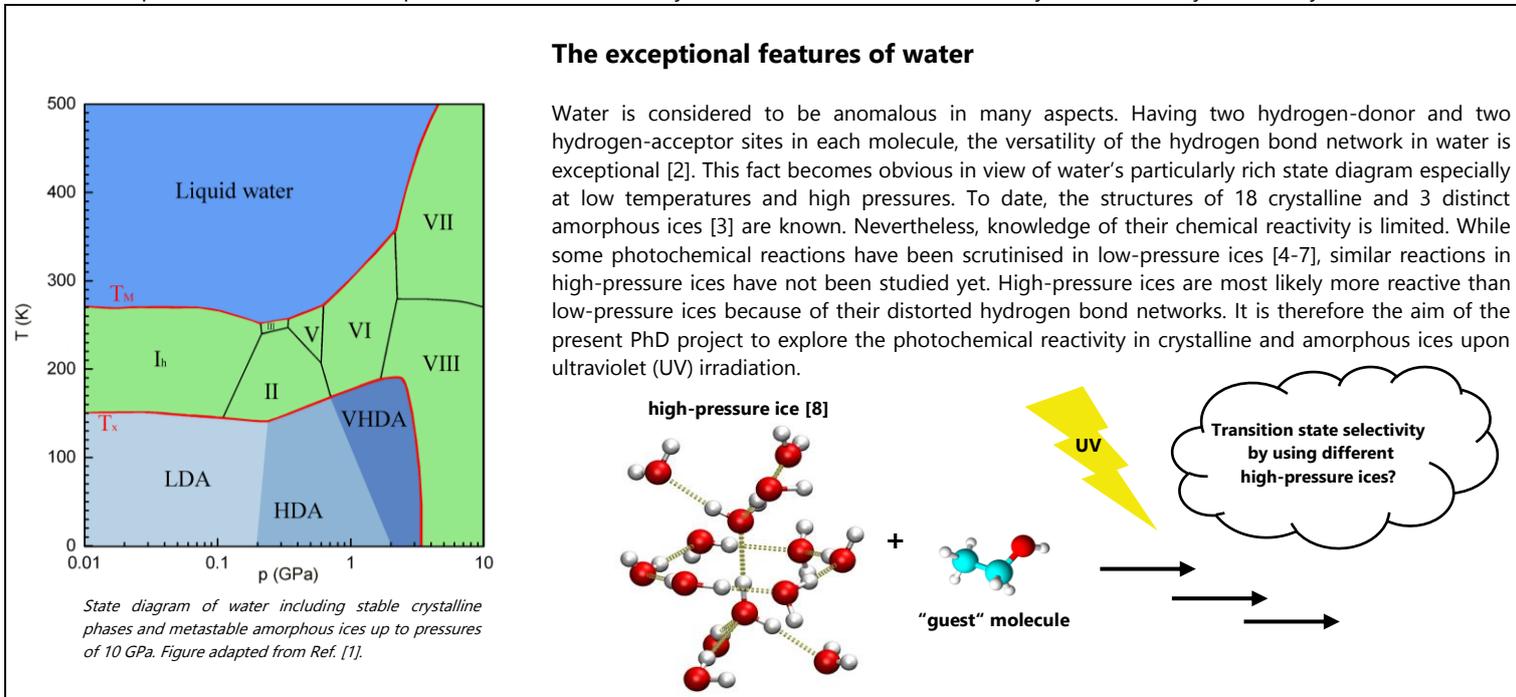


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### Key steps of the project

1. Spectroscopic characterisation of high-pressure ices in UV-VIS-NIR range

2. UV-Irradiation experiments, monitoring the solid phase by IR, Raman

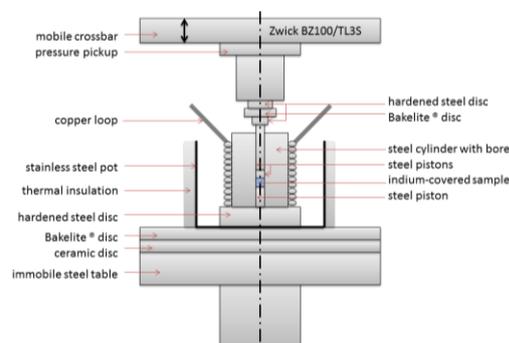
3. UV-Irradiation experiments, monitoring the gas phase by CP-FTMW

University of Innsbruck (Loerting Lab)

DESY (Schnell Lab)

### Experimental

High-pressure ices are prepared using the piston cylinder set-up established in the Loerting Lab (right). Regarding the UV/VIS and NIR characterisation of high-pressure poly(amorphous) ices the utilisation of spectrometers of the desired spectral range seems straightforward. However, the necessity of keeping the ice samples at temperatures < 100 K during spectroscopic measurements without condensation of ordinary hexagonal ice is far from trivial. To overcome these problems, powdered ice samples will be cooled by liquid nitrogen during NIR and UV/VIS measurements in diffuse reflection mode. In *Step 2* of this project, an IR spectroscopy setup including a *Varian 3100 FT-IR* spectrometer operating in transmission mode will be used. It is the aim to achieve UV-irradiation experiments with *in situ* FT-IR and *ex situ* XRD characterisation of the high-pressure ice samples. In order to study the gas phase during radiation experiments, a microwave spectroscopy (CP-FTMW) setup in the Schnell Lab at DESY (Hamburg) will be employed. This method detects rotational transitions of polar molecules in the gas phase. Since rotational spectra depend on the moments of inertia of the molecules, structural isomers, conformers, and even isotopologues have unique rotational spectra and can be unambiguously differentiated. As a result, CP-FTMW is uniquely mixture sensitive.



Schematic depiction of the high-pressure piston cylinder setup used in the Loerting lab [9].

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