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## Ultrasensitive $\beta$ -NMR in chemistry

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The  $\beta$ -detected NMR technique is a well-described nuclear spectroscopy technique known to give signals with up to ten orders of magnitude more sensitive than conventional NMR. This is achieved by combining the hyperpolarization of the radioactive nuclear spins with lasers and the detection of the emitted beta particles. An additional advantage of the  $\beta$ -NMR is the ability to perform the real-time investigation of chemical reactions, such as biomolecular folding processes and catalytical mechanisms.

Herein, we demonstrate the basic principles of our technique, experimental setup and detailed data analysis. We will focus on the results obtained in 2018 (chemical shifts and T1 relaxation times) supported by conventional  $^1\text{H}$  and  $^{23}\text{Na}$  NMR results explaining the  $^{26}\text{Na}$  dynamics in liquid hosts such as ionic liquids. Additionally, we will complement our conclusions with quantum mechanical computations.

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