# NMR detection at sub-µM concentrations by para-hydrogen induced hyperpolarization

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NMR spectroscopy is one of the most versatile techniques for the study of molecules and their mixtures. Yet, compared to several other analytical techniques, it is relatively insensitive. The practical limit of detection in the mid-µM concentration regime has hindered the application of NMR in the analysis of complex mixtures and dilute analytes.

A variety of nuclear hyperpolarization techniques have been developed to address this issue. Notably, recent developments in the Signal Amplification By Reversible Exchange (SABRE) technique have allowed to detect and quantify sub-µM concentration analytes in short NMR experiments. The presentation will discuss the principle of SABRE hyperpolarization and show, how the interaction of analytes with *para*-hydrogen and iridium-organometallic catalysts can be used for signal enhancement, allowing to expand the applications of NMR in (bio)mixture analysis.

Examples of SABRE in complex mixture and biofluid analysis will be shown. The development of a SABRE enhanced doping detection method will be discussed, where it was possible to meet WADA requirements for sensitivity in the NMR detection of stimulants in athlete's urine.