SHARPER NMR: OUR JOURNEY TO REMARKABLE SENSITIVITY GAINS

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The SHARPER (Sensitive, Homogeneous And Resolved PEaks in Real time) NMR experiment, proposed originally in the context of reaction monitoring, removes all homonuclear and heteronuclear splittings from a selected signal by pulsing only on the observed nucleus. SHARPER compensates for magnetic field inhomogeneity, producing very narrow singlets.[1] A recent extension of SHARPER allowed simultaneous monitoring of a reactant and a product.[2]

Optimised acquisition and processing of spectra further improved sensitivity as demonstrated by the implementation of SHARPER on benchtop NMR spectrometers.[3] Hyperpolarised benchtop ^{19}F NMR, a combination of SHARPER with the parahydrogen-based SABRE, provided an additional 2 to 8 fold SNR improvement beyond that achieved through hyperpolarisation alone. By incorporating the SHARPER acquisition mode into existing NMR experiments we can dramatically enhance their sensitivity by collapsing parts (whole spectrum) into a singlet (Fig. 1).

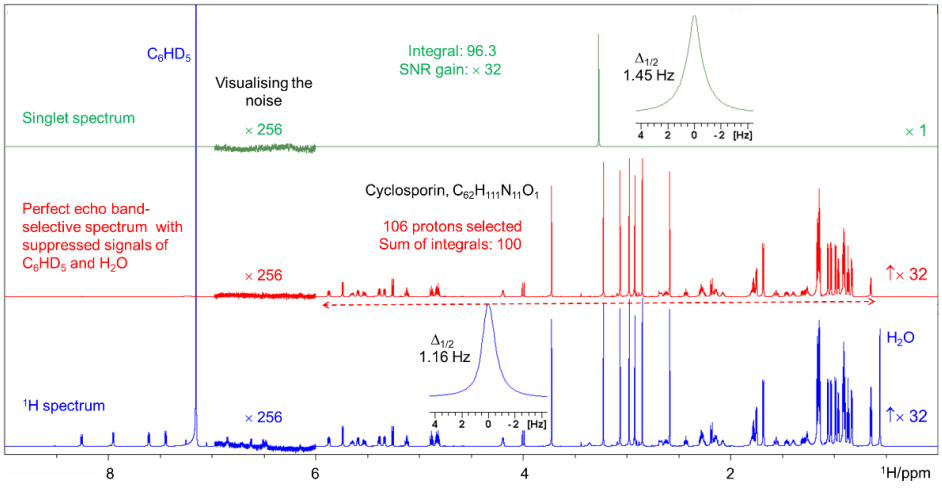

Figure 1. Collapsing a large part of an 800 MHz ^{1}H NMR spectrum of cyclosporine into a singlet.

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