

## An Active Feedback Scheme for Improved Low Field NMR Detection

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The mandatory strive for high signal to noise ratio (SNR) in low field NMR must take into account all specific constraints on the characteristics of the detection scheme. For instance, in liquid NMR a reduced coupling between the sample and the detection coil is desirable to avoid significant radiation damping and frequency pulling. For MRI a broad detection bandwidth is desirable to avoid overdamping of the finest details in the image. More generally, broadband detection allows for fast ring-down and for prompt recovery from saturation in pulsed NMR.

We describe a solution based on a simple active feedback scheme whose major advantage is to fully preserve SNR, in contrast with the traditional Q-damping scheme. We report on implementation at low temperature for the study of hyperpolarised liquid  $^3\text{He}$ - $^4\text{He}$  mixtures, where active feedback is used to either enhance or reduce radiation damping. Further illustration is provided by application to MRI and diffusion measurements in small animal lungs with hyperpolarised  $^3\text{He}$  gas at 300 K.