# Improved Nuclear Magnetic Resonance Spectroscopy Using Half-Spin Echo Data Recovery

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# Half Spin Echo Data and Iterative Numerical Method Improves NMR Spectroscopy

Nuclear magnetic resonance (NMR) spectroscopic quality can be improved by acquiring more half spin echo data and using an iterative numerical method to reconstruct missing data points of the corresponding full symmetrical echo data. This method avoids the degrading effects of noise and provides higher-quality NMR spectrum with sharper peaks. The baseline of this technique is also improved which allows more resonance peaks to emerge from the region close to the water peak which allows chemical functional groups to be easily distinguished from water. The half spin-echo data technique is particularly advantageous at higher magnetic fields.

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#### **Poor Spectral Resolution**

Current NMR spectroscopy uses half spin-echo data which produces poor spectral resolution and a low signal to noise ratio, which limits sensitivity and specificity and makes it harder to analyze chemical compounds. Half spin echos occur when a secondary refocusing radio frequency (RF) pulse is applied to a relaxed magnetic moment.

## FEATURES/BENEFITS OF IMPROVED NMR SPECTROSCOPY USING HALF SPIN ECHO DATA:

- Improved specificity and sensitivity by reducing the impact of noise on the NMR spectrum obtained
- Improved baseline allows more resonance peaks to emerge from the region close to the water peak
- High-resolution at high magnetic fields

## Technology ID z00135

### Category

Engineering & Physical Sciences/Instrumentation, Sensors & Controls Engineering & Physical Sciences/MRI & Spectroscopy Life Sciences/Diagnostics & Imaging Life Sciences/MRI & Spectroscopy Software & IT/Algorithms

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Director of the Center for Magnetic Resonance Research. Dr. Ugurbil's research interests at the Center for Magnetic Resonance Research include development of ultrahigh field magnetic resonance methodology for MR imaging and spectroscopy, mechanisms of coupling of MR detectable signals to brain activity, and oxidative-metabolism in the brain and neurochemistry.