

# NMR Data Inversion Algorithm

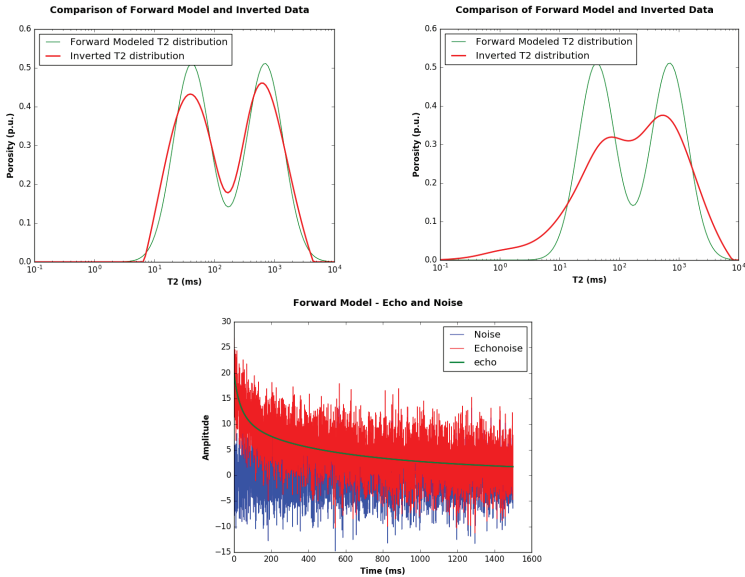
## Research Themes

The goal of NMR data inversion is to obtain the T<sub>2</sub> amplitude distribution from the T<sub>2</sub> echo train signal. NMR data inversion is an ill-posed problem, because noise in the data allows for many possible solutions. We solve for the amplitudes on an equally spaced logarithmic scale, mimicking typical pore size distributions. If we simply used a least square method on this problem we might “under-fit” or “over-fit” the data, so we adopted a technique called Tikhonov-Regularization to restrict the range of possible solutions. This involves minimizing the sum of squares of the error with an added constraint related to the Euclidean norm of the data. We then optimize the “length” of the solution vector.

Using a stable version of this algorithm detailed parametric studies were performed. We generated forward models for the T<sub>2</sub> echo train, using an assumption of multiply peaked amplitude distributions and varying levels of Gaussian noise.

## Recent Accomplishments

The forward models were then inverted using the inversion algorithm to examine how much of the original information was lost. We conclude with a discussion of the limitations of NMR inversion.



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