

IMPROVING RESOLUTION IN NMR USING PATHWAY SELECTIVE PULSES

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Determining the availability of evolution pathways in quantum systems, which is important to a variety of spectroscopies, is often accomplished with a pathway selection scheme (PSS). Recently [1], we introduced a method of converting a PSS into a pathway selective pulse (PSP) which selectively excites spin systems **only if** certain evolution pathways are available. In designing a PSP, perfect time-reversal is required, which, unfortunately, can only be achieved in very simple spin systems. In this presentation, we study the effects of imperfect time-reversal due to homonuclear spin-spin couplings, field inhomogeneity, and relaxation on the performance of PSPs. Finally, we experimentally demonstrate that PSPs can be used to improve spectral resolution by reducing NMR line widths by roughly 10-20%.

[1] C.D. Ridge and J.D. Walls, "Pathway Selective Pulses", *J. Phys. Chem. Lett.* **2**, 2478-2482 (2011).