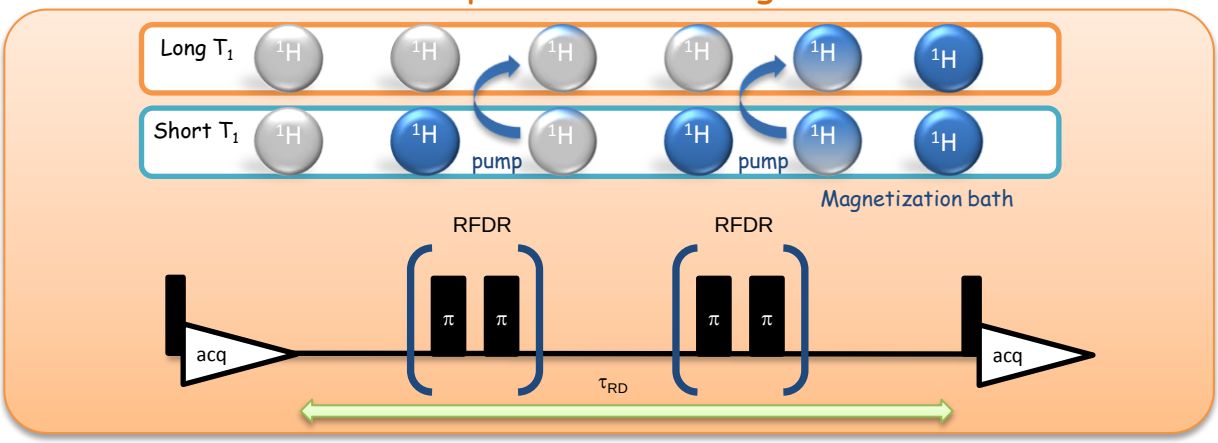
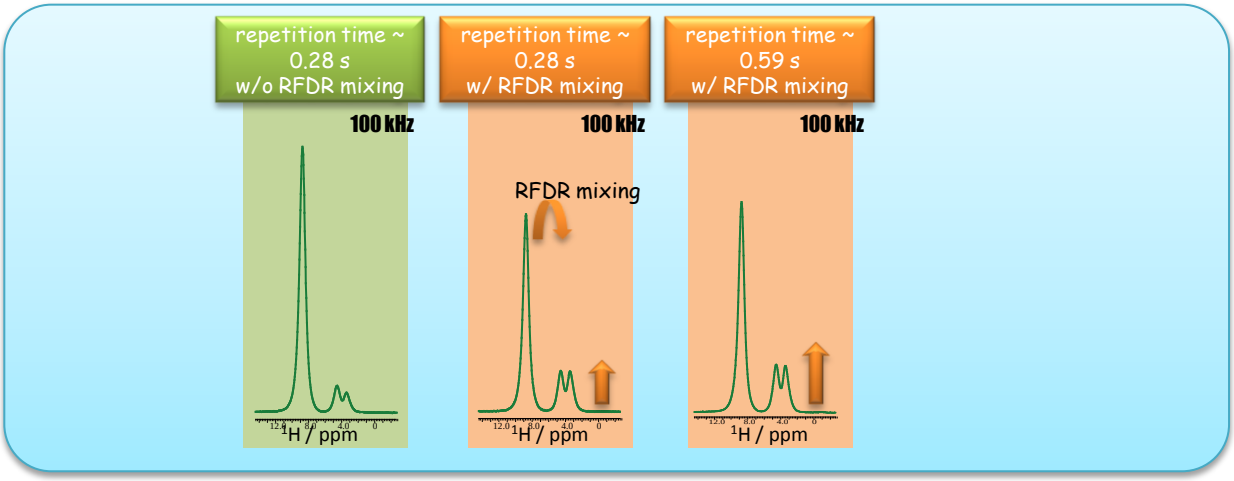
Quick repetition for ^{1}H NMR at ultrafast MAS

All the ^{1}H nuclei tend to show uniform T_1 relaxation time in the same molecule at moderate MAS rate (<20 kHz), because of rapid ^{1}H spin diffusion. However, this common belief breaks when the sample is spun at ultrafast MAS rate (>60 kHz). Each ^{1}H nucleus may show individual T_1 relaxation time. In such a case, the repetition time should be determined by the longest ^{1}H T_1 relaxation time, even if the other ^{1}H nuclei have much shorter ^{1}H T_1 relaxation time. To solve this uncomfortable and inefficient situation, we mix the magnetization during repetition delay by RFDR. The RFDR sequence brings magnetization from quickly polarized ^{1}Hs to slow ^{1}Hs and reduces the optimal repetition time, leading to sensitivity enhancement.

How RFDR helps to recover magnetization.



Experimental verification



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