

### Doty Quad-Fast-MAS H-F/X/Y/Z HR-Solids

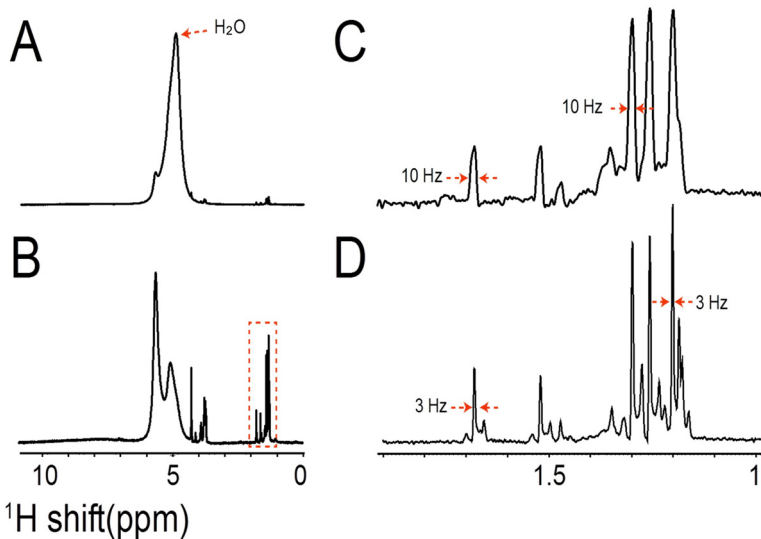
- True Solids Quad Resonance
- High resolution – 3 Hz  $^1\text{H}$
- $^2\text{H}$  high-power decoupling
- Broadband H/X/Y/Z
- Fast-MAS
- (1.3 mm coming)
- Widest VT range
- NB or WB, all fields
- Four Efficient Channels
- Fast, Efficient MAG Coil (option)
- To 1300 MHz (coming)



500 MHz, NB, H/X/Y/Z  
3 mm MAS Probe with  
3 Broadband Channels

Acknowledgement:  
NIH R43GM117905

### 500 MHz Proton Detected $^1\text{H}$ NMR of Protein GB1.



(A) Simple  $^2\text{H}$  decoupled (10 kHz cw)  $^1\text{H}$  spectrum. The peak at 5 ppm is residual water signal.

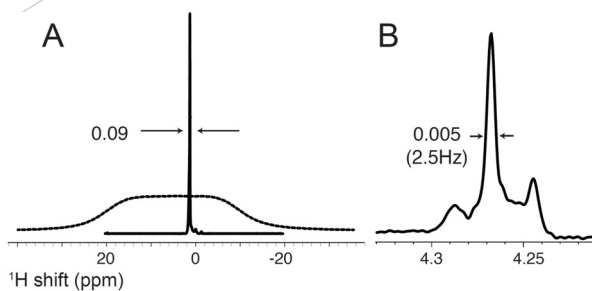
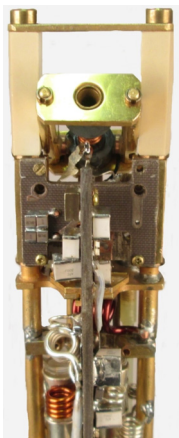
(B) Same as A, but water suppressed.

(C) & (D) The expanded region (red box in B) for methyl protons without and with  $^2\text{H}$  decoupling, respectively. Linewidths at half maximum are shown in Hz. (Note the major linewidth reduction from 10-kHz  $^2\text{H}$  decoupling.)

Bibhuti Das and Paul Ellis, Doty Scientific, Inc., and Professor Leonard Mueller, Univ. of CA Riverside.

## H-F/X/Y/Z MAS Applications

### Quad-Fast-MAS H-F/X/Y/Z $^1\text{H}$ NMR using a novel line narrowing CRAMPS pulse sequence



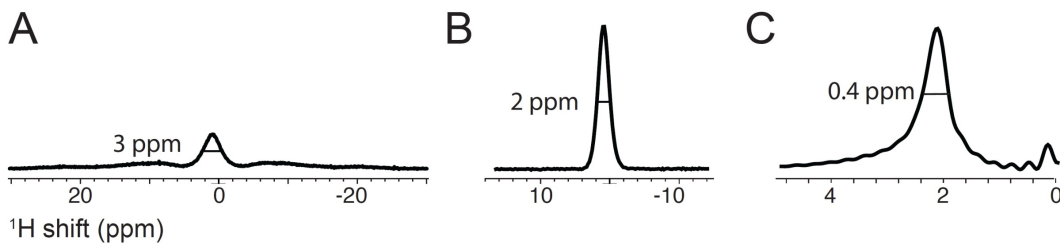
**500 MHz Proton Detected  $^1\text{H}$  NMR of  
Adamantane and Protein GB1.**

(A) Adamantane  $^1\text{H}$  spectrum recorded with only 10 kHz MAS (solid line) and non-spin condition (dotted).

(B)  $^2\text{H}$  decoupled  $^1\text{H}$  spectrum from 100% back exchanged  $^2\text{H}$ ,  $^{13}\text{C}$ ,  $^{15}\text{N}$  labeled microcrystalline protein GB1.

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### Fast-MAS H-F/X/Y/Z $^1\text{H}$ NMR of HMB At 50 kHz MAS



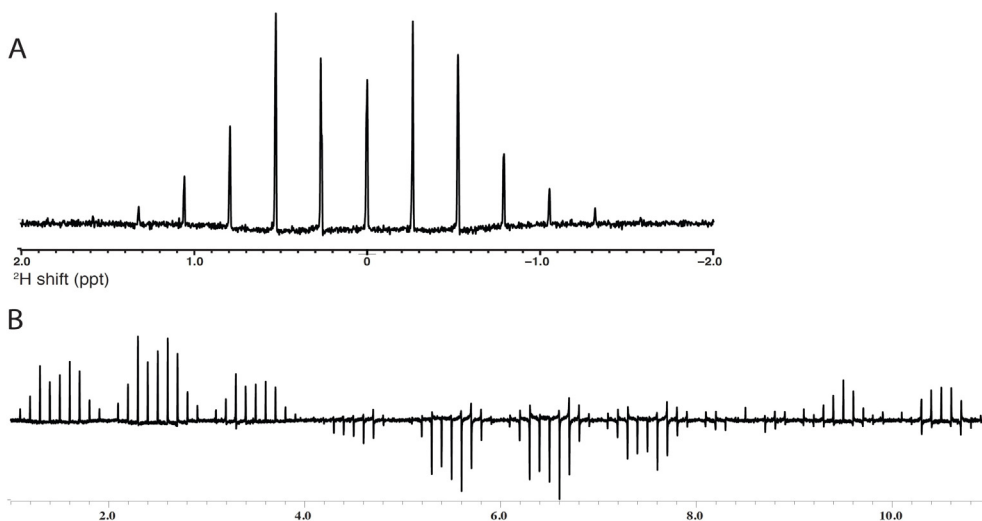
(A) 10 kHz MAS

(B) 50 kHz MAS

(C) 50 kHz MAS and windowed acquisition (wPMLG3).

$^1\text{H}$  spectra of HMB at 500 MHz (1mm sample).

### $^2\text{H}$ Spectra of 98% Deuterated Proline Powder.



(A)  $^2\text{H}$  spectrum was recorded under 20 kHz MAS using a 3 mm Doty H-F/X/Y/Z probe and five small tip angle (22.5 degree each) RESPIRATION pulses.

(B)  $^2\text{H}$  nutation for 300 Watt RESPIRATION pulses.