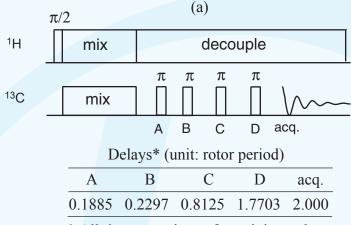
#### 1. Introduction

**TO**tal Suppression of Spinning Sidebands (TOSS) is achieved by using a series of  $\pi$  pulses at carefully determined points in a rotor cycle, after excitation (initial  $\pi/2$  pulse or CP).

## 2. Pulse sequence



<sup>\*</sup> All times are given after mixing pulse.

(b)

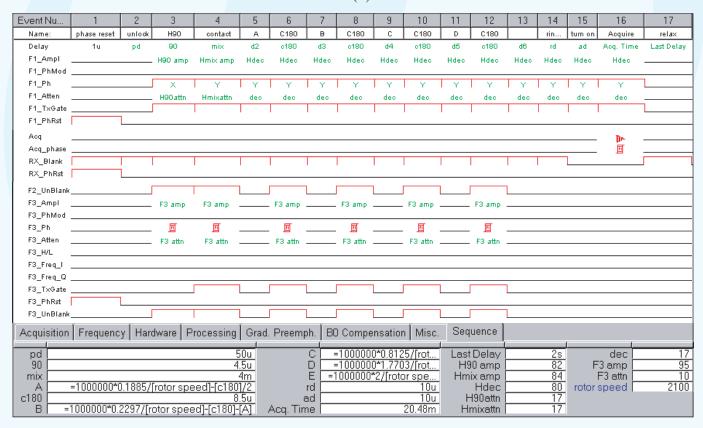


Fig. 1a: TOSS pulse sequence. b: Actual sequence in the NTNMR sequence editor. The delays between  $\pi$  pulses are calculated conveniently by means of mathematical expressions in dashboard (Fig.1b, lower section). Update occurs automatically upon entry of the rotor speed and  $\pi$  pulse width.



### 3. Experiment

Sample: Hexamethylbenzene

 $^{1}$ H\_90°: 4.5 μs Mixing rf field: 55 kHz  $^{13}$ C\_180°: 8.5 μs  $^{1}$ H decoupling: 55 kHz Rotor speed: 2.1kHz

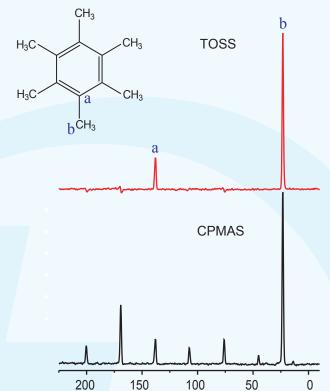


Fig. 2 Top: TOSS spectrum of hexamethyl benzene. Bottom: CPMAS spectrum.

13C Chemical Shift (ppm)

### 4. Results

The CPMAS spectrum (Fig. 2, bottom) shows the methyl carbon peak and benzene ring carbon peak with sidebands. The corresponding TOSS spectrum (Fig. 2, top) exhibits no sidebands.

# 5. Reference

(1) Dixon, W. T., Schaefer, J., Sefcik, M. D., Stejskal, E. O., and McKay, R. A. "Total Suppression of Spinning Sidebands in CPMAS C-13 NMR" *J. Magn. Reson.* **49**, 341-345, 1982.



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