1. Introduton

A **T**wo **P**ulse **P**hase **M**odulation (TPPM)[1] proton decoupling scheme is often used to improve proton decoupling in double resonance magic angle spinning (MAS) experiments. Figure 1 shows a TPPM scheme following a cross-polarization from proton to a rare spin. TPPM is conveniently implemented with an asynchronous event incorporating a two-event sequence.

2. Pulse sequence

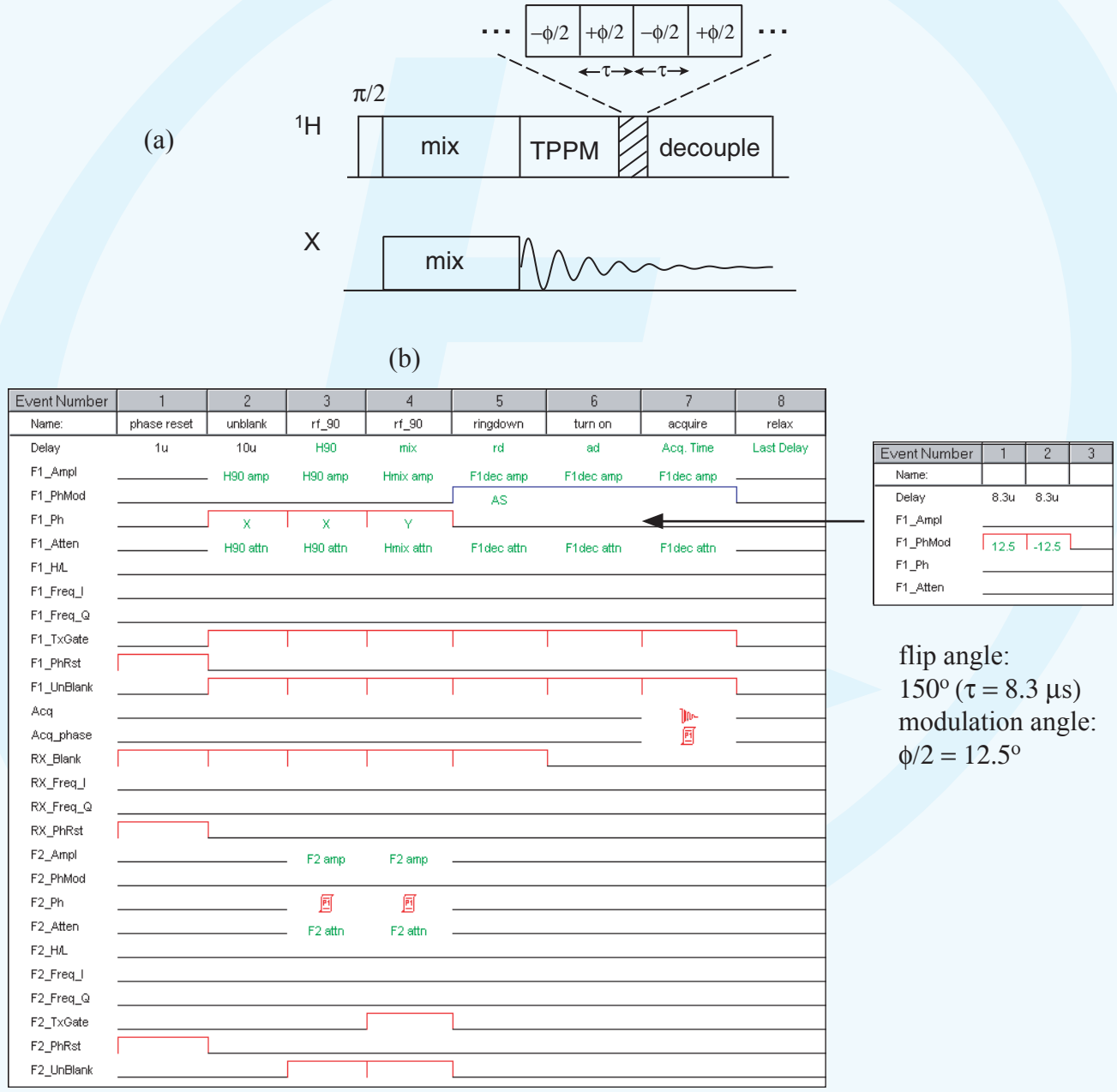

Fig. 1a: CP-TPPM pulse sequence. b: Actual pulse sequence in the NTNMR sequence editor.

3. Experiment

Sample: u-^{13}C, ^{15}N-histidine
Rotor speed: 5 kHz
Proton 90° pulse width: 4.5µs
Mixing *rf* field: 55.5 kHz
Proton decoupling field: 62.5 kHz
TPPM flip angle = 150° (τ = 8.3 µs); ϕ/2 = 12.5°
Number of scans: 4

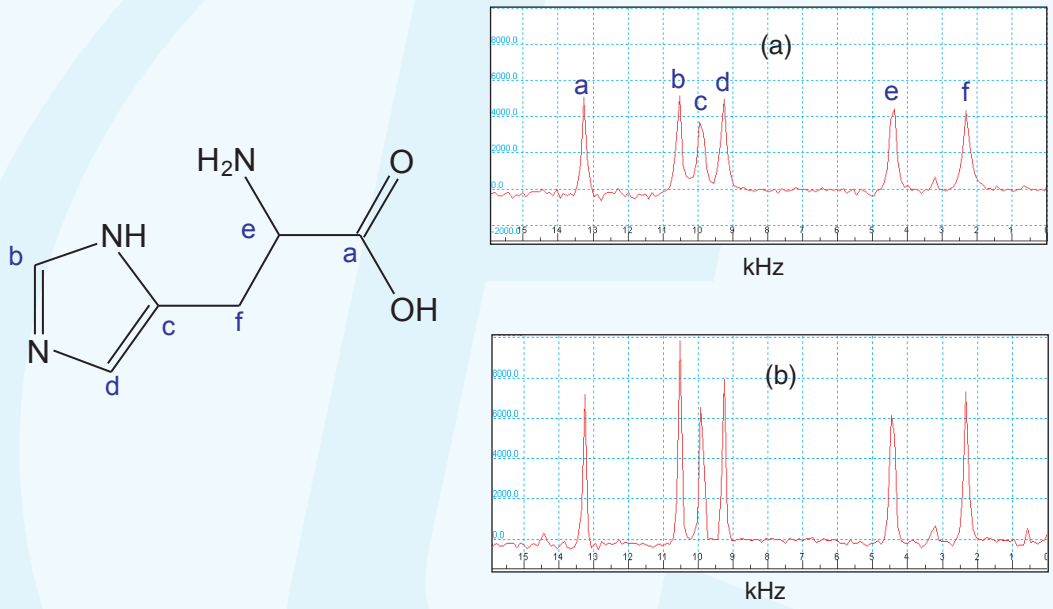

Fig. 2. ^{13}C CPMAS spectra of u-^{13}C, ^{15}N-histidine with (a) *cw* decoupling and (b) TPPM decoupling. Note improvement in linewidth (75 Hz to 145 Hz) and corresponding increase in signal to noise ratio.

4. Reference

1. A.E, Bennett, C.M. Rienstra, M. Auger, K.V. Lakshmi, and R.G. Griffin, *J. Chem. Phys. 103,* 6951, 1995.