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Supplementary Material –

Two figures: one showing comparison of DCOSY and NOESY spectra on the DNA 16mer duplex and one with the DCOSY pulse sequences.

Figure S1. The H1' to aromatic proton region of the DCOSY spectrum of the DNA 16mer duplex dissolved in 20mg/mL Pf1 phage. This region of the spectrum shows ^{1}H-^{1}H dipolar interactions between the aromatic protons (pyrimidine H6 and purine H8) and the deoxyribose H1' protons. Crosspeaks associated with the strongly J-coupled cytosine H5-H6 protons are marked with arrows and have opposite sign (dotted lines) to the crosspeaks resulting from the dipolar couplings (solid lines) in the DCOSY. (B) The same region of a NOESY spectrum collected under identical conditions on the DNA 16mer duplex without phage. Shown is the aromatic to H1' sequential walk. Each intraresidue aromatic-H1' crosspeak is labeled by residue number, and the arrows point to the C H5-H6 crosspeaks. The DNA sequence is shown at the bottom of Figure 2. Except as noted, sample conditions are as described in Figure 2. The DCOSY spectrum was acquired using an 80ms (8.3kHz) DIPSI-2 mixing sequence (Fig. 2B). The NOESY was collected using a 200ms mixing time under equivalent conditions as the DCOSY. Both spectra were collected at 500 MHz at 25°C in 14 hrs.

Figure S2. Pulse sequences for DCOSY experiments used in this study. In all sequences, a solid bar represents a 90° pulse. (A) The DCOSY experiment with phase cycling ϕ_1 = x, -x, y, -y; trim pulse = y, y, -x, -x, -y, -y, x, x; and receiver = x, -x, y, -y. The WALTZ-16 mixing sequence, designated with a shaded box, is phase cycled with the trim pulse (y, y, -x, -x, -y, -y, x, x) for the in-phase version of the sequence but this phase cycle is shifted by 90° (-x, -x, -y, -y, x, x, y, y) for the orthogonal version of the sequence. (B) The z-filtered DCOSY experiment with phase cycling ϕ_1 = x, -x, -x, x, y, -y, -y, y; ϕ_2 = x, x, -x, -x, y, y, -y, -y; ϕ_3 = x; and receiver = x, -x. The z gradients are applied prior to and following the mixing sequence and are designated as boxes below the pulse sequence. This experiment applies the mixing sequence (shaded box) orthogonal to the proton magnetization either with a DIPSI-2 or a WALTZ-16 spinlock applied along y.

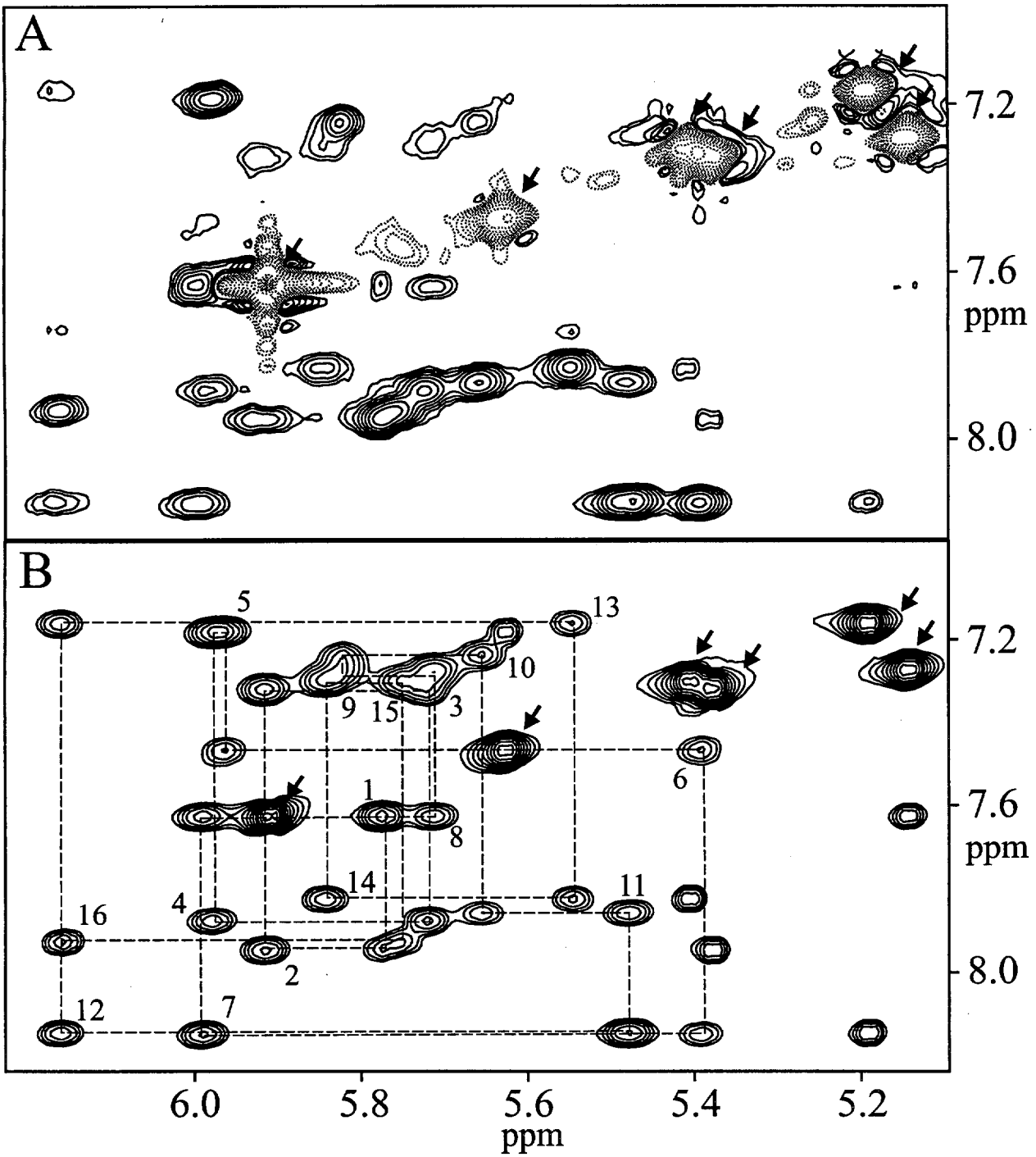

Figure S1

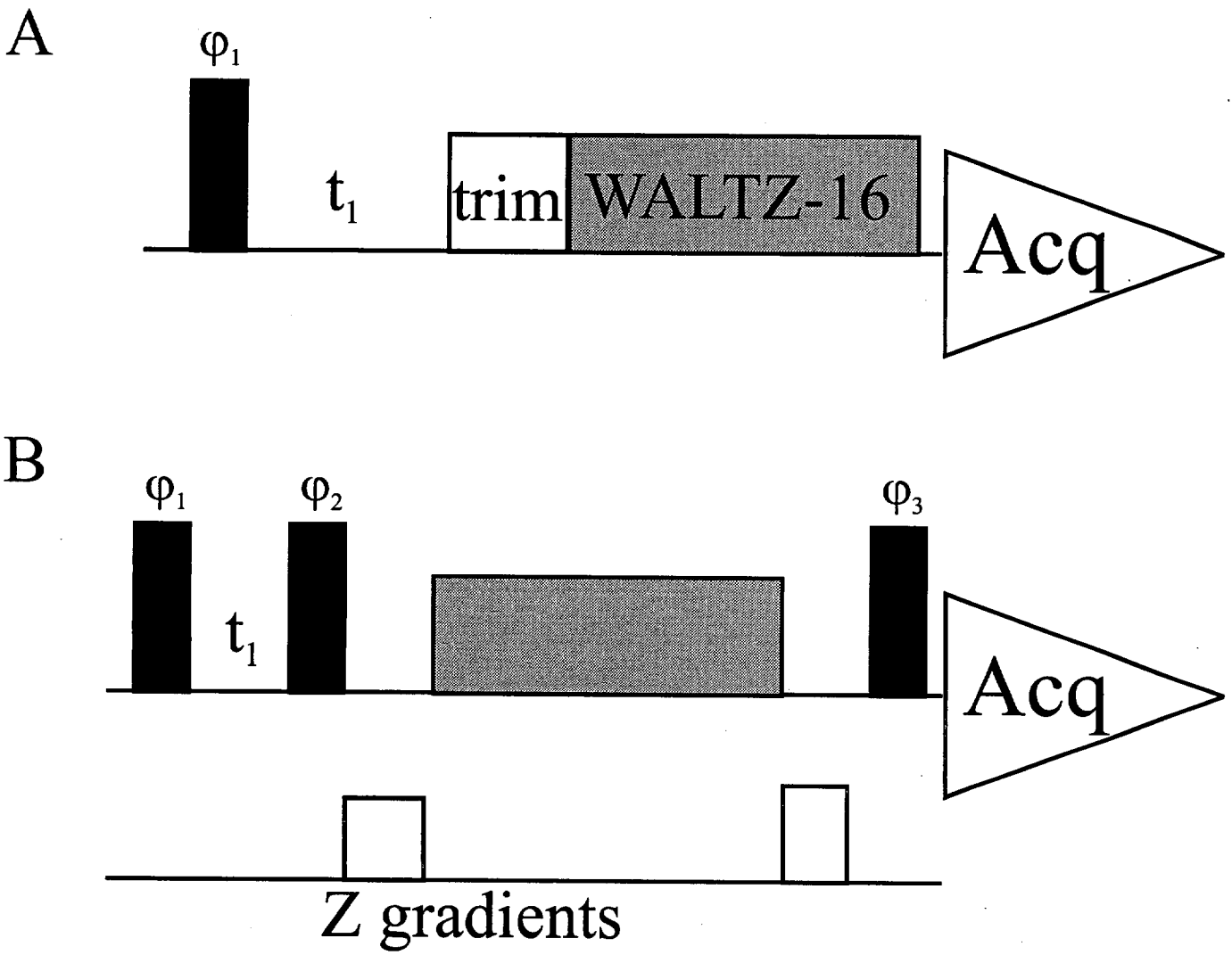

Figure S2