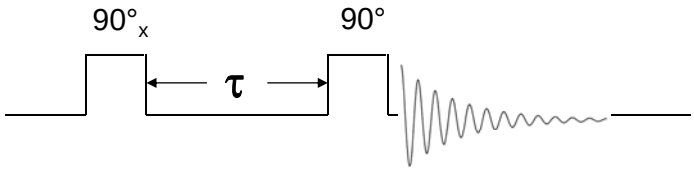
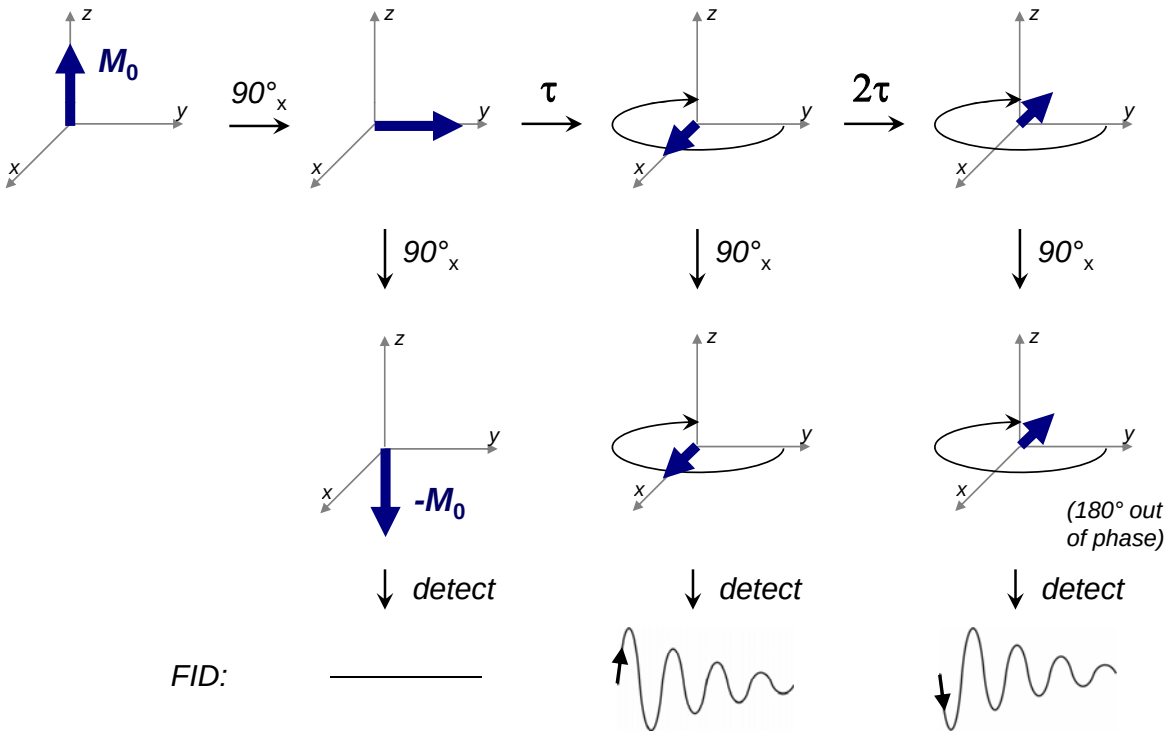
Two-Dimensional Correlated Spectroscopy (2D-COSY)



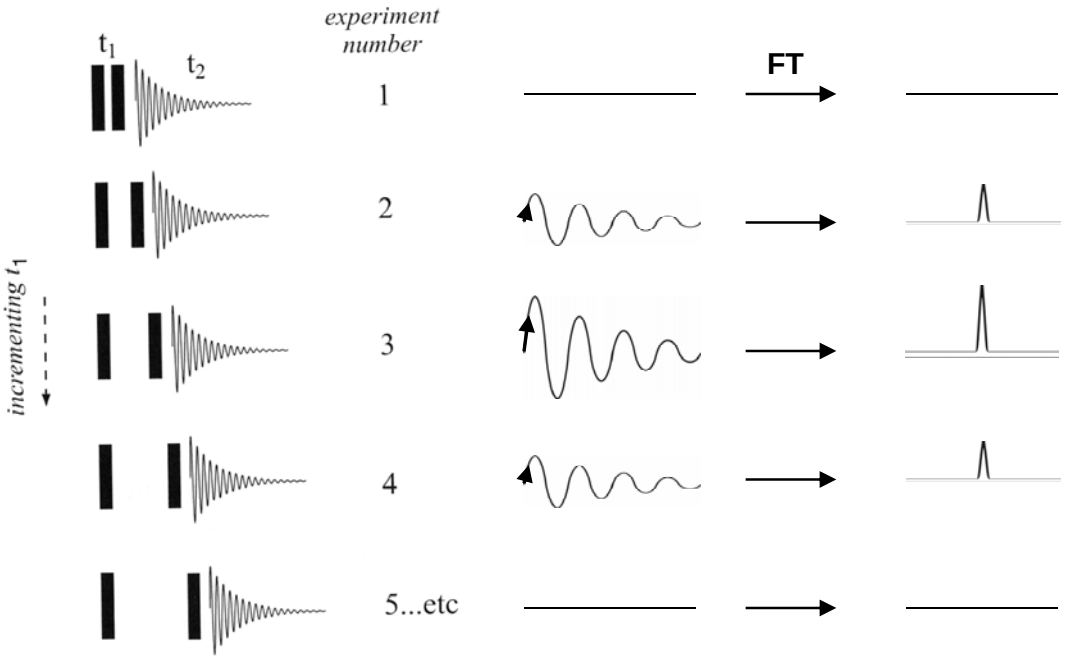
τ is on the order of precession of **M** about $\mathbf{B_0}$ (Larmor frequency, μsec).

Fourier transform of FID gives 1D; Fourier transform of information with varying τ gives 2D.

The COSY Sequence

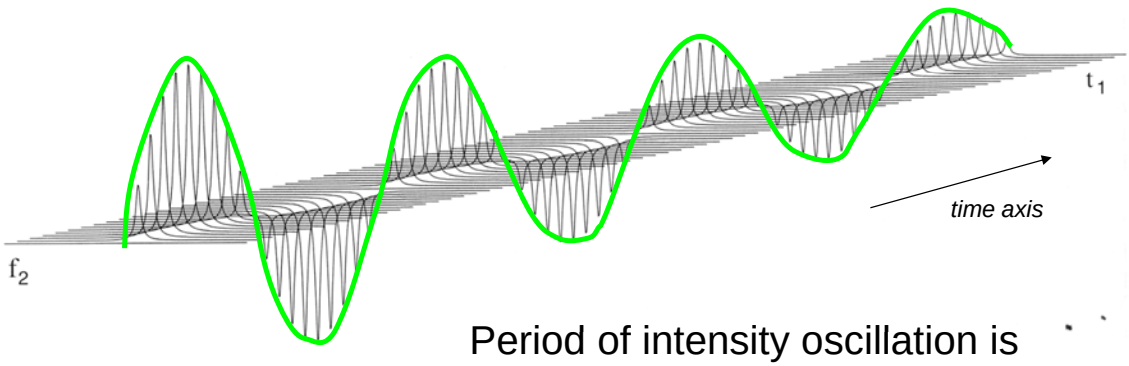


The COSY Sequence



COSY is an (auto)arrayed experiment. Takes a while.

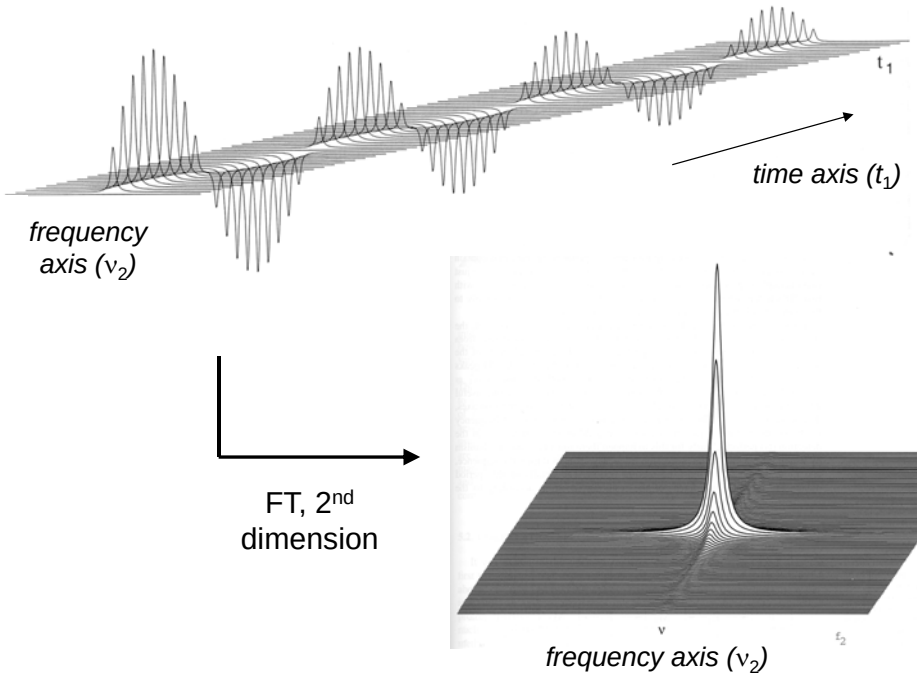
COSY: The First Dimension



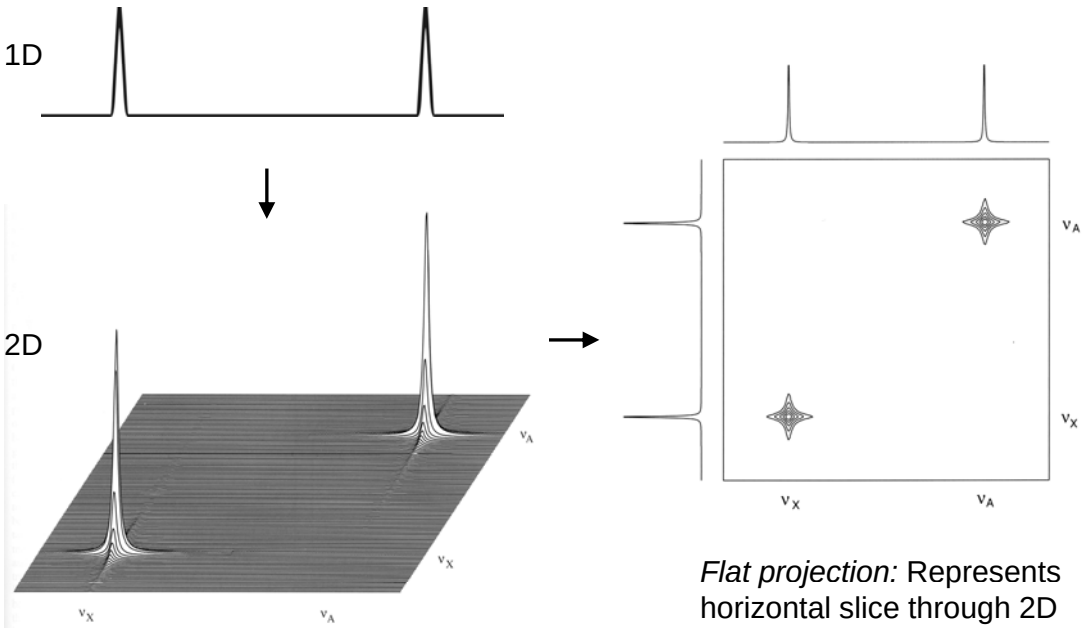
Period of intensity oscillation is Larmor frequency.

So, oscillation represents an FID.

COSY: The Second Dimension

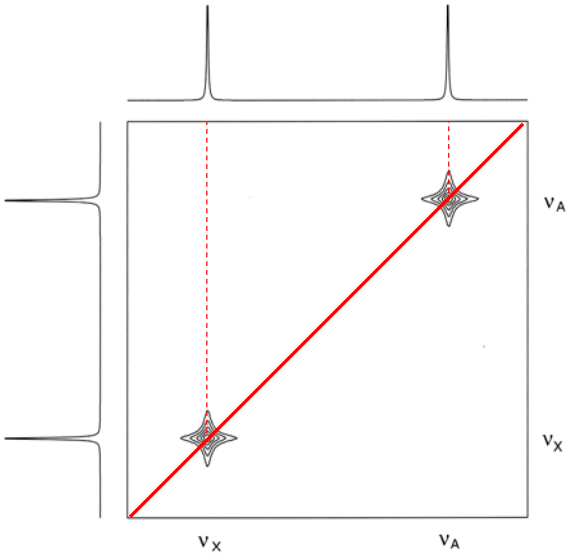


COSY: The Second Dimension



Flat projection: Represents horizontal slice through 2D spectrum.

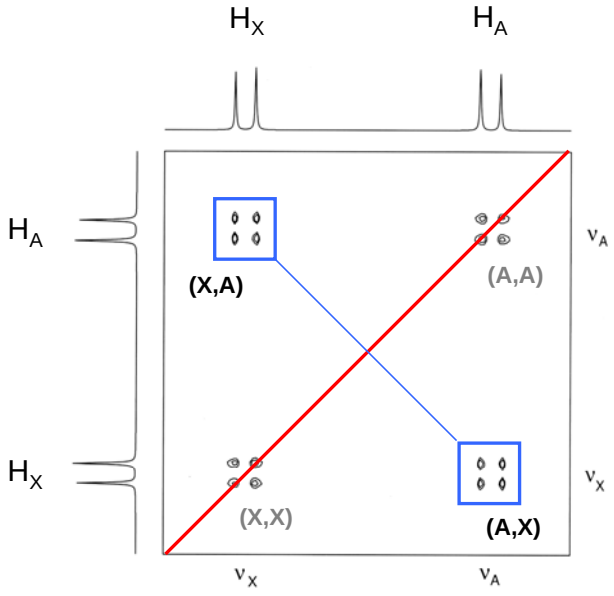
COSY: Splitting and Cross-Correlation



This spectrum contains no new information; Wherever there is a peak on one axis, there is a peak on the diagonal.

However, if resonances are *coupled*, **coherence transfer leads to crosspeaks**.

COSY: Splitting and Cross-Correlation

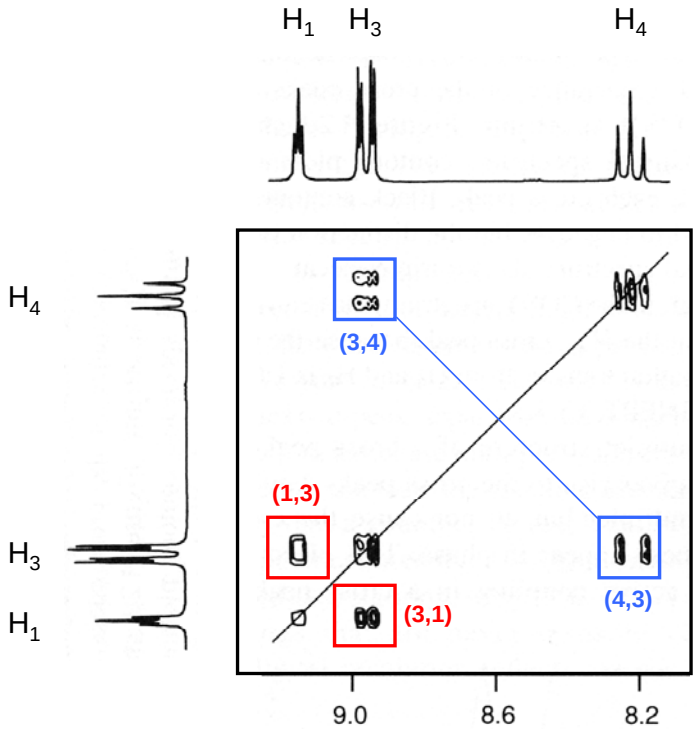


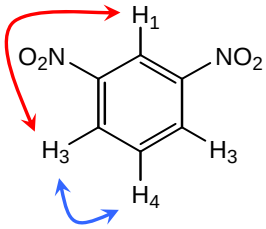
However, if resonances are *coupled*, **coherence transfer leads to crosspeaks**.

Symmetric set of off-diagonal peaks correspond to coupling.

So, in this case, H_A and H_X must be coupled.

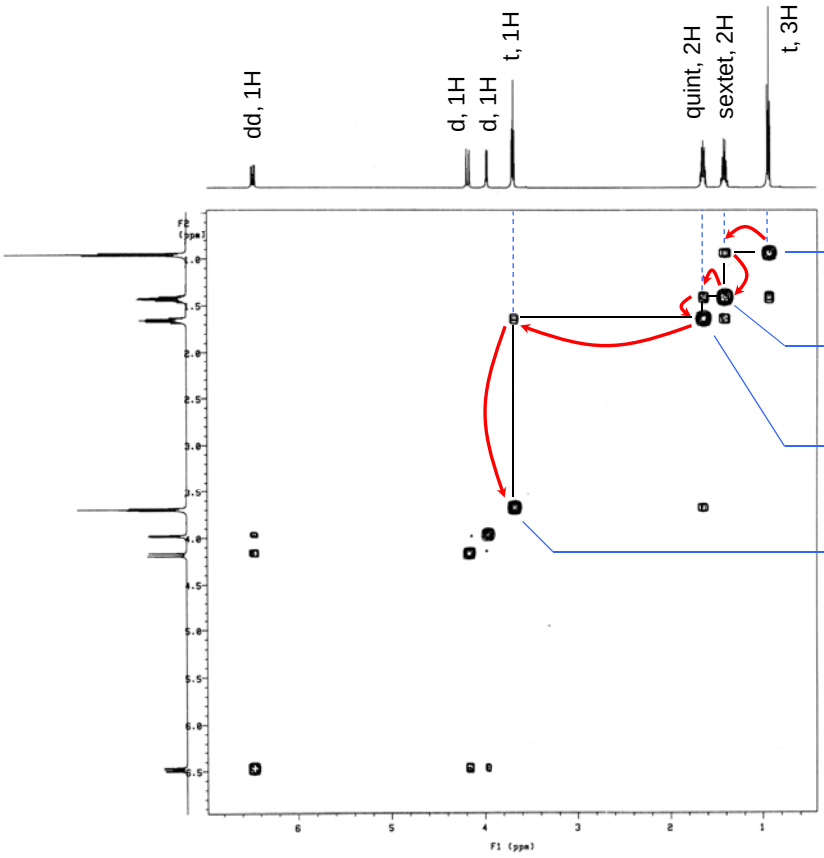
COSY: Splitting and Cross-Correlation

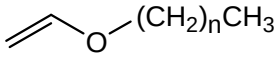




What is and isn't coupled?

(In the past, you have done this with coupling constants. COSY is more powerful.)





What is n?

Start at likely -CH_3 resonance.

Walk. Must be coupled to -CH_2-.

Which is coupled to another -CH_2- .

Which is coupled to last -CH_2O- .

COSY is particularly good at identifying chains of coupled protons, via the "COSY walk"