

Shaped (Selective) Pulses

- Rectangular Pulses: Off —On(pw) — Off
 - Previously All Pulses Were Rectangular: Off-On-Off; Height = Amplitude, Width = Duration
 - Short Duration Pulses (e.g. 12 μ s) at High Power Excite All Peaks in the NMR Spectrum Evenly
 - Long Duration Pulses (e.g. 35 ms) at Low Power Excite a Narrow Range of NMR Peaks in the Spectrum, in the Center of the Spectral Window
 - Rectangular Pulses Give Wiggles in the Excitation Profile: “sinc” function = $\sin(\nu) / \nu$
- Shaped Pulses: Amplitude Varies with Time
 - Amplitude of a Shaped Pulse Follows a Defined Function in Time, e.g. Gaussian “Bell Curve”
 - A Shaped Pulse is Really a Series of Many Short Rectangular Pulses with Different Amplitudes
 - Gaussian Shaped Pulses Lead to a Gaussian Shape in the Excitation Profile: No Wiggles
 - Excitation Center Can Be Moved from Center to Any Position in the Spectrum
 - Selective Excitation Allows You to “Grab” One Proton in the Molecule and Ask Questions About Its Neighbors (J coupling, through-space distance)