Pure NQR Quantum Computing

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It is shown that pure NQR can be utilized as a platform for quantum computing without applying a high external magnetic field. By exciting each resonance transition between quadrupole energy levels with two radio-frequency fields differing in phase and direction, the double degeneracy of the spin energy spectrum in an electric field gradient is removed. As an example, in the case of $I = \frac{7}{2}$ (nuclei $^{133}$Cs or $^{123}$Sb) the energy spectrum has eight levels which can be used as three qubits.

Key words: NQR; Quantum Computing; Zeeman Effect.