CLAIMS

1. A method for controlling one or more qubits in a quantum processing system, the quantum processing system comprising a plurality of qubits, the method comprising:

generating an AC electromagnetic field;

modulating the amplitude of the AC electromagnetic field to generate an amplitude modulated AC electromagnetic field;

applying the amplitude modulated AC electromagnetic field to the quantum processing system to create a plurality of dressed qubits, wherein in an idle mode the plurality of dressed qubits are on resonance with the amplitude modulated AC electromagnetic field; and

individually controlling the Larmor frequency of one or more of the plurality of dressed qubits to change synchronously with the amplitude modulated AC electromagnetic field to perform an operation on the one or more of the plurality of dressed qubits.

2. The method of claim 1 wherein the amplitude modulated AC electromagnetic field is applied globally to all dressed qubits.

3. The method of claim 1 wherein the amplitude modulated AC electromagnetic field is applied locally to each dressed qubit.

4. The method of claim 1, wherein the amplitude modulation frequency of the amplitude modulated AC electromagnetic field is engineered to be in a predefined proportion with the Rabi frequency of the plurality of dressed qubits.

5. The method of any of the preceding claims, where the Larmor frequency of the plurality of dressed qubits is set to be within a predefined threshold range.

6. The method of any of the preceding claims, where the Rabi frequency of the plurality of dressed qubits is set to be within a predefined threshold range.

7. The method of claim 1, wherein the plurality of dressed qubits are spin qubits in a semiconductor substrate.

8. The method of any of the preceding claims where the quantum processing system is a silicon-based system.

9. The method of claim 7, wherein the quantum processing system is a silicon MOS system.

10. The method of any one of the preceding claims, wherein the plurality of dressed qubits are encoded in one or more electrons or holes confined in quantum dots.

11. A method for controlling one or more qubits in a quantum processing system, the quantum processing system comprising a plurality of qubits, the method comprising:

applying an always on AC electromagnetic field to the quantum processing system to create a plurality of dressed qubits, wherein in an idle mode the plurality of dressed qubits are on resonance with the AC electromagnetic field; and

performing an initialization, qubit gate, or readout operation on one or more of the plurality of dressed qubits by leveraging Pauli's exclusion principle while the AC electromagnetic field is applied to the quantum processing system.

12. The method of claim 11, further comprising, to perform qubit gate operations on the one or more qubits, individually controlling the Larmor frequency of the one or more of the plurality of dressed qubits to bring the one or more of the plurality of dressed qubits off resonance with the AC electromagnetic field.

13. The method of any of claims 11 to 12 wherein the AC electromagnetic field is an amplitude modulated AC electromagnetic field.

14. The method of any of claims 11 to 12, wherein the AC electromagnetic field has a constant amplitude.

15. The method of any one of claims 11 to 14 wherein the AC electromagnetic field is applied globally to all dressed qubits.

16. The method of any one of claims 11 to 14 wherein the AC electromagnetic field is applied locally to each dressed qubit.

17. The method of any one of claims 11 to 16, wherein the Larmor frequency of the plurality of dressed qubits is set to be within a predefined threshold range.

18. The method of any one of claims 11 to 16, wherein the Rabi frequency of the plurality of dressed qubits is set to be within a predefined threshold range.

19. The method of any one of claims 11 to 18, where the Larmor frequency of the one or more of the plurality of dressed qubits is controlled via a spin-orbit interaction.

20. The method of any one of claims 11 to 19, further comprising:

performing a single-qubit gate operation on a qubit of the one or more of the plurality of dressed qubits by modulating a detuning between the Larmor frequency of the qubit and the frequency of the AC electromagnetic field, wherein the detuning is modulated by shifting the Larmor frequency of the qubit sinusoidally at a frequency that matches the amplitude of the Rabi frequency of the qubit.