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(54) **Title:** QUBIT AND QUANTUM PROCESSING SYSTEM

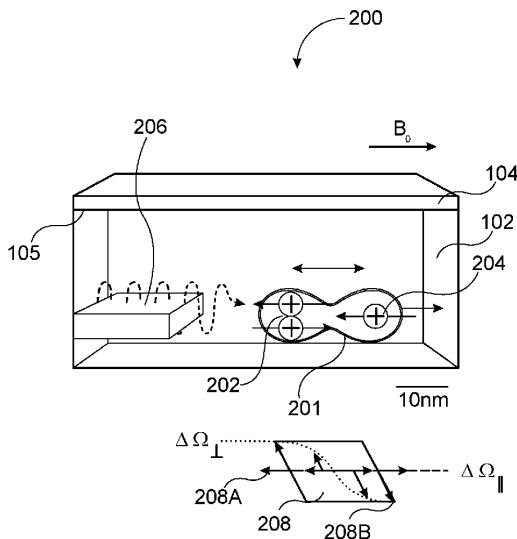


FIG. 2

(57) **Abstract:** A quantum bit, quantum processing element, and one or more large-scale quantum processing systems are disclosed. the quantum bit includes: a first quantum dot embedded in the semiconductor substrate, the first quantum dot comprising a first donor atom cluster and a second quantum dot embedded in the semiconductor substrate, the second quantum dot comprising a second donor atom cluster. The first and second quantum dots share a single electron, and the quantum bit is electrically controlled utilising the hyperfine interaction between the single electron and one or more nuclear spins present in the first and second donor atom clusters.

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