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Generalized correlation induced tunneling gate and its application in deterministic Bell-basis measurement XING DENG, LUSHUAI CAO, YAOYAO XU, XIAOCHUN DUAN, Huazhong University of Science and Technology — A new type of quantum gate is designed for qubits encoded in the orbital degree of freedom of ultracold lattice atoms. This quantum gate is based on the so-called correlation induced co-tunneling of two atoms confined in two neighbor sites of an optical lattice and occupying the s- and p-orbital of the site. This gate can generate any of the four Bell states of the two qubits from a component of the corresponding Bell state. Moreover, this gate can also map the four Bell states to different detectable states, and realize deterministic full Bell-basis measurement.

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