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Possible exotic superconductivity in the monolayer and bilayer silicene FAN YANG, YUGUI YAO, LI-DA ZHANG, CHENG-CHENG LIU, FENG LIU, School of physics, Beijing Institute of Technology — Silicene, the silicon-based counterpart of graphene, has attracted a lot of research interest since synthesized recently. Similar honeycomb lattice structures of the two systems let them share most of their marvelous physical properties. The most important structural difference between the two systems lie in the noncoplanar lowbuckled geometry in silicene, which brings up a lot of interesting physical consequence to the system. Here we focus on possible exotic superconductivity (SC) in the family, via random phase approximation (RPA) study on the relevant Hubbard-models. Two systems of this family are studied, including the monolayer and bilayer silicene. For the former system, we found an electric-field driven quantum phase transition (QPT) from chiral d+id to f-wave SC when the field is perpendicular to the silicene plane. For the latter system, we found that even the undoped system is intrinsically metallic and superconducting with chiral d+id symmetry and tunable Tc which can be high . Our study not only provides a new playground for the study of the exotic SC, but also brings a new epoch to the familiar Si industry.

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