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Title:A tunable electron wave filter based on graphene superlattices with periodic potential patterns

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Abstract:We have theoretically calculated a tunable electron wave filter based on graphene superlattices with one-dimensional periodic potentials. It is found that such structure with defect layer possess an unusual tunneling state occurring inside the forbidden gap, and the tunneling state can be modulated by changing the width of the defect layer. We have also achieved independently tunable multichannel electron wave filters by constructing fractal structures. The modulation of the transmission gap by width, period number, and incidence angle may lead to potential applications in graphene-based electronic devices. © 2011 American Institute of Physics.