

# **Zigzag hexagonal phosphorene quantum dot as a spin inverter in the presence of Rashba effect**

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Received: 17.01.2017      Accepted: 13.02.2019

## **Abstract**

In this study, we investigate the spin polarized current in a zigzag hexagonal phosphorene quantum dot composed of 24 and 54 phosphorus atoms using Green's function method. Supposing that all input electrons have spin-up orientation, we have shown that an output current with desirable spin polarization may be achieved by applying an appropriate external electric field controlled by a gate voltage. Particularly, there are conditions where the spin of all electrons can be inverted; therefore, the system can act as a spin inverter that has special applications in spintronics and quantum computations. Moreover, it is demonstrated that increasing the size of phosphorene quantum dot leads to the increase of polarized current.

**Keywords:** zigzag hexagonal phosphorene quantum dot, spin inverter, spin polarization, Green's function

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