

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Electronic structure of parabolically confined quantum wire with Rashba and Dresselhaus spin-orbit interactions under the influence of perpendicular magnetic field¹ SEVIL SARIKURT, Department of Materials Science and Engineering, Texas A&M University, College Station, TX 77843-3003, SERPIL SAKIROGLU, KADIR AKGUNGOR, ISMAIL SOKMEN, Department of Physics, Faculty of Science, Dokuz Eylul University, Izmir, 35390, TURKEY — We have investigated the effect of spin-orbit (SO) coupling on the energy level spectrum and spin texturing of parabolically confined quantum wire that is subjected to an externally applied perpendicular magnetic field. Additionally we have also taken into account exchange-correlation contribution. Highly accurate numerical calculations have been carried out by finite element method. Our results have been revealed that the interplay of the SO coupling with effective magnetic field significantly modifies the band structure, producing additional subband extrema and energy gaps. Energy subband structure varies depending on which type of SO coupling strength is considered and also the magnitude of SO coupling. We also obtain that spatial modulation of spin density along the wire width can be considerably modified by SO coupling strength, magnetic field and charge carrier concentration. Besides, we have observed that the presence of exchange-correlation contribution leads to a softening behavior in the local maxima at subbands and shifts all energy subbands to lower energy values. Numerical results point out that the combined effect of exchange-correlation and SO coupling produces asymmetry in the dispersion relations.

¹Supported by Scientific and Technological Research Council of Turkey.

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Date submitted: 14 Nov 2014

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