

Ho, Choon-Lin

Quasi-exact solvability of Dirac equation with Lorentz scalar potential. (English)

Zbl 1097.81027

Ann. Phys. 321, No. 9, 2170-2182 (2006).

Summary: We consider exact/quasi-exact solvability of Dirac equation with a Lorentz scalar potential based on factorizability of the equation. Exactly solvable and $sl(2)$ -based quasi-exactly solvable potentials are discussed separately in Cartesian coordinates for a pure Lorentz potential depending only on one spatial dimension, and in spherical coordinates in the presence of a Dirac monopole.

MSC:

81Q05 Closed and approximate solutions to the Schrödinger, Dirac, Klein-Gordon and other equations of quantum mechanics

Cited in 8 Documents

81U15 Exactly and quasi-solvable systems arising in quantum theory

Keywords:

Dirac monopole

Full Text: [DOI](#) [arXiv](#)

References:

- [1] Rabi, I., Z. phys., 49, 507, (1928)
- [2] Sauter, F., Z. phys., 69, 742, (1931)
- [3] Lam, L., Phys. lett., A31, 406, (1970)
- [4] Turbiner, A.; Ushveridze, A.G., Phys. lett., A126, 181, (1987)
- [5] Turbiner, A., Commun. math. phys., 118, 467, (1988)
- [6] Kamran, N.; Olver, P.; González, A.; Kamran, N.; Olver, P.J., J. math. anal. appl., Commun. math. phys., Contemp. math. phys., 160, 113, (1994)
- [7] Shifman, M.A.; Turbiner, A.V.; Shifman, M.A.; Turbiner, A.V.; Post, G.; Turbiner, A.V.; Shifman, M.A., Commun. math. phys., Contemp. math., Contemp. math., Russ. J. math. phys., Int. J. mod. phys., A4, 2897, (1989), 3305
- [8] Ushveridze, A.G., Quasi-exactly solvable models in quantum mechanics, Sov. phys.—Izvest. inst. rep., 2, 50, (1994), IOP Bristol, 54 · Zbl 0834.58042
- [9] Brihaye, Y.; Kosinski, P., Mod. phys. lett., A13, 1445, (1998)
- [10] Ho, C.-L.; Khalilov, V.R.; Chiang, C.-M.; Ho, C.-L., Phys. rev., J. math. phys., Mod. phys. lett., A20, 673, (2005)
- [11] Ho, C.L.; Roy, P., J. phys., A36, 4617, (2003)
- [12] Ho, C.L.; Roy, P., Ann. phys., 312, 161, (2004)
- [13] Y. Brihaye, A. Nininahazwe, Dirac oscillators and quasi-exactly solvable operators. Available from: <quant-ph/0503137> (2005). · Zbl 1073.81036
- [14] Chodos, A.; Jaffe, R.L.; Johnson, K.; Thorn, C.B.; Weisskopf, V., Phys. rev., D9, 3471, (1974)
- [15] Bhaduri, R.J., Models of nucleons, (1988), Addison-Wesley Reading, MA
- [16] Znojil, M., Mod. phys. lett., A14, 863, (1999)
- [17] Schulze-Halberg, A., Chinese J. phys., 42, 117, (2004), 234
- [18] Cooper, F.; Khare, A.; Sukhatme, U., Phys. rep., 251, 267, (1995)
- [19] McNeil, J.A.; Shepard, J.R.; Wallace, S.J.; Ginocchio, J.N., Phys. rev. lett., Phys. rep., 315, 231, (1999), See, e.g.,
- [20] Grib, A.A.; Mamaev, S.G.; Mostepanenko, V.M., Vacuum quantum effects in strong fields, (1988), Energoatomizdat Moscow
- [21] Ho, C.L.; Khalilov, V.R.; de Castro, A.S., Phys. rev., Phys. lett., A328, 289, (2004)
- [22] Cooper, F.; Khare, A.; Musto, R.; Wipf, A., Ann. phys., 187, 1, (1987)
- [23] Nogami, Y.; Toyama, F.M., Phys. rev., A47, 1708, (1993)
- [24] Bhalerao, R.S.; Ram, B.; de Castro, A.S.; Cavalcanti, R.M.; Hiller, J.R., Am. J. phys., Am. J. phys., Am. J. phys., Am. J. phys., 70, 522, (2002)

- [25] de Castro, A.S.; Hott, M., Phys. lett., A342, 53, (2005)
- [26] Junker, G., Supersymmetric methods in quantum and statistical physics, (1996), Springer-Verlag Berlin · [Zbl 0867.00011](#)
- [27] Gross, F., Relativistic quantum mechanics and field theory, (1993), Wiley New York
- [28] Torres del Castillo, G.F.; Cortés-Cuautli, L.C., J. math. phys., 38, 2996, (1997)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.