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Paper adds a new item to the series of constructions of the (incomplete) sets of the bound states generated by the Dirac equation in some elementary central external potential. The idea is to study just the s -wave equations (because then, the “uncomfortable” centrifugal term vanishes) and to select an interaction admitting a change of variables which transforms the equation into the Gauss hypergeometric differential equation.

This time, the authors picked up the special case of the Eckart potential in the form which has been made popular by R. D. Woods and D. S. Saxon in Phys. Rev. 95 (1954) 577]. The two different relativistic versions of this potential with a vector component $V(r)$ and with a scalar component $S(r)$ are considered, constrained by a constant shift C in (i) $V = S + C$ (case called spin-symmetric), (ii) $V = C - S$ (pseudo-spin-symmetric case). Each of these cases is studied, roughly speaking, (a) at the small C and (b) at the larger C .

Summarizing the results of the letter: Two of the proposed bound-state solutions (i-b) and (ii-a) are simply wrong. It is easy to show that they manifestly violate the asymptotic physical boundary conditions. No surprise - they were sought in the scattering regime.

Bound-state solution (i-a) is correct but not new. The related text is virtually a carbon copy of the exercise Nr. 64 in S. Fluegge, Practical Quantum Mechanics I (Springer, Berlin, 1971), p. 162. By the way, the authors overlooked that this solution is approximate rather than “exact” as they claim in the first line of their Abstract.

Finally, the author’s method cannot work in the last contemplated case (ii-b). Hence, their conclusion (viz., the absence of the bound-state solutions) remains unfounded. In fact, it may be shown correct/incorrect for the positive/negative Woods-Saxon couplings, respectively.

Comments to the MR Editors: This is the revised text of my recent ex-

tended abstract - now, the same MSC codes (and my address) apply (and should be used also here).