



Universidad de Valladolid



Dirac equation in (2+1) dimensions with a polar symmetric contact interaction

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Abstract: Contact interactions are very useful to model short-range interactions in nonrelativistic and relativistic quantum mechanics, and are typically described by potentials given by combinations of the Dirac delta or its derivatives. Due to the singular nature of these potentials, these models require a suitable mathematical treatment, such as the mathematical theory of self-adjoint extensions of symmetric operators, or the theory of distributions. In this seminar I will present some ideas of a work in progress, in which we consider the Dirac equation in (2+1) dimensions, with a contact singular potential concentrated on a circumference. The polar symmetry of the system allows us to reduce the problem to one dimension (the radial one) and to establish a complete analogy with genuine 1D contact interactions, reinterpreting the analogous physical parameters to the planar case. We consider some special cases of contact potentials, motivated by the physical interpretation of the singular potential strengths, and will present some preliminary results concerning bound states and resonances.



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