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SDI FINAL EVALUATION FORM 1.1

PART 1:

Journal Name:	**Physical Review & Research International**
Manuscript Number:	**2013_PRRI_6994**
Title of the Manuscript:	**Two-Body Dirac Theory**

PART 2:

FINAL EVALUATOR'S comments on revised paper (if any)	**Authors' response to final evaluator's comments**
The authors have not addressed the majority of my comments from the first and second versions, either implicitly or explicitly. Nor have they given reasons for not making the changes. 10 of my comments have been answered implicitly in the text by the format improvements but no response was given. I have removed these from the list. A further 4 comments were addressed explicitly by the authors and I have removed then from the list, although I am unsatisfied with one. I thus reproduce the remaining unaddressed comments from the first version of the paper. In addition, I have the following new comments based on the second and third drafts. - page 3, paragraph 2: what does it mean "electron has zero photons"? How does an electron HAVE photons? Please rewrite. - Suggestion. Often you use \omega by itself. So sometimes you are talking frequency and other times energy. I would suggest using \hbar \omega so that you are always talking about energy (apples with apples). - Page 4, first paragraph: I would suggest a new paragraph at "What is the ground state?" or somewhere in this paragraph. You are introducing new ideas and hence you should create a new paragraph for each idea. - Page 5, first paragraph: please remove italics unless it obvious why italics is used. - Page 5, first paragraph: "do not lie empty". This makes it sound like all the states are empty, where I think you mean at least one state is empty. - Page 5, first paragraph: "and absent electron…" should be new sentence. - "N" and "E" should be in math font throughout the paper - Page 17, paragraph 2: "In the present application A = 0". This implies your derivation is not general. So could you please comment in the text on the consequences to your result that it is not totally general? - Page 18, eigenvalue equations. Could you please use a different notation for the operator and its eigenvalue? 3 occurrences. - I believe some of the information in the conclusion should be in the abstract. The abstract now says what you will do but not the result you obtained. Unaddressed comments: 7) L432-436: Why is the exchange of a photo incompatible with Lorentz invariance? This sentence is not clear. 8) What does L426-447 have to do with the above calculation? It seems out of place and should not go here. It is largely repeat of the concepts in the introduction. 16) L654-658 is an important statement to this paper and you should cite a reference rather than just stating it. 17) L664: What is equation (4), it does not exist. 18) "where" should be replace by "which is". 19) L682: "can be written down and solved". Please write it down since you us it. 20) L682-684: What is the difference between fully relativistic and Lorentz invariant? The Dirac equation is invariant under a Lorentz transformation (Lorentz group). It can describe a relativistic particle (non-relativistic too). 22) L696: Define what \kappa and \mu are. 23) L698: G and F are functions of r, since you explicitly write this for most of the occurrences of G and F, please write it for all. 24) Put a comma after equation (III-2). 25) L692-705 is a run-on sentence; please brake it up into more than one sentence. 26) The equations in L701-705 are using the same symbol for the operation and its eigenvalue. Please use a different symbol, and define them in the text. 27) "w" in L713 and elsewhere should be in math font. In general all mathematical symbols in the text should be in the same font they appear as in the equations. 29) The figures should be referenced in the order in which they are referenced in the text. L732 mentions figure 4 but we have not encountered figures 2 or 3 yet. 30) L732: How do you know the agreement is 99.6%? Please explain this.	**I have responded to most of his new comments. I either did not fathom or did not agree with his suggestions which I left unaddressed.** **(7) Done** **(8) I left it in. These concepts need to be carefully addressed even at the expense of redundancy. Tolstoy did not mind repetition.** **(16) Does not need a reference. Anyone will recognize that the Hartree model gives a one body Dirac theory, as in the hydrogen atom but with the Coulomb potential replaced with a model potential.** **(17) Done** **(18) Done** **(19) I responded using the set of equations given by Eqs. (III-1).** **(20) There are relativistic theories (Breit theory) which are not Lorentz invariant.** **(22) The reader is assumed to be know these quantum numbers by his/her background in Dirac theory.** **(23) Done** **(24) Done** **(25) Done** **(26) No change of notation needed. Clear from context.** **(27) I don't know what he means by math font. I can't find any "math" font on my processor.** **(29) Figures now referenced in order. Figs. 2-3 occur toward bottom of page 19; Figs. 5-6 toward middle of page 20.** **(30) Sentence rewritten to explain.**
1) The title is too general. The paper really presents a solution to the positronium problem using the Hartree-model. In this sense the abstract could also be shorten to just tell what is done in the paper. 2) After reading a lengthy introduction, I have no idea what this paper is going to do. The calculation in the paper has to be motivated by the introduction. In the introduction, clearly state what will be done in the paper and why it is important.	**(1) The paper is more general than the calculation and concerns two-body Dirac theory versus one-body Dirac theory with an abstract two-body interpretation. Title stays as it is.** **(2) I have given an outline of the paper at the end of Section I**

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1) A lot of concepts are repeated. For example, the idea in L74-76 is already stated. L365-369 is a repeat of the previous sentence. L377-379 is a repeat of the previous sentence. 2) I'm not sure the old hole-theory is still taken as seriously as the authors lead on. 3) Are figures 2,3,5,6 useful? What do I learn from them? If they are useful please state in the text why. 4) L806-810 seem rather obvious to me already. 5) Ref. [10], why is the DOI give for this reference but non of the others? 6) I would remove Ref. [15]. Anyone able to understand this paper already knows that the dot product of two 4-vectors is a scalar under a "special" Lorentz transformation.	**(1)Repetition is not a crime (Tolstoy).** **(2) Hole theory is taken with a theologian's gravitas by atomic theorists who use it as a recipe for calculating the positive-energy levels. Their assumption is that coupling to the radiation field would result in the decay of the atomic ground state unless the negative-energy levels are filled with electrons.** **(3) Done** **(4) Readers are reassured by statements of what they already know or think they know.** **(5) Notation of online publication.** **(6) It may be true, but I have never seen students of Dirac theory point it out. I think it is helpful to relate a subject which is always written about in the weeds, as it were, to a general, beautiful result from a classic text.**