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Journal Name:	**Physical Science International Journal**
Manuscript Number:	**Ms_PSIJ_37327**
Title of the Manuscript:	**Mesoscopic RLC Circuit and its Associated Occupation Number and Berry Phase**
Type of the Article	**Original Research Article**

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This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty'**, provided the manuscript is scientifically robust and technically sound.
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PART 1: **Review Comments**

	Reviewer's comment	**Author's comment***(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Compulsory REVISION comments	**Clarify the contribution of mass dependent model to the RLC, particularly highlights the differences against Pedrosa and Pinheiro results.** **Calculate the Bogoliubov's transformations and specify the interval [t_i, t_f] in the sense of rel. 15 and 16 from Petarpa and Visser paper.**	I added a clarification that the time-dependent mass is due to a comparison between the structure of the time-dependent harmonic oscillator Hamiltonian (1) and that of the Caldirola-Kanai Hamiltonian (18). As stated throughout the introduction, even though I am quantizing the time-dependent harmonic oscillator using the invariant operator method as Pedrosa and Pinheiro consider in their paper, I am going far beyond their analysis by considering the solution to the auxiliary equation using the Ermakov equation (which they do not, they only consider the particular solution to the Milne-Pinney equation), derive the occupation number for the induced quasi-particle (which they do not), as well as the associated Berry phase (which they do not). Therefore, not only am I improving upon their results, by use of the Ermakov equation, but expanding and adding to their results. In quantum field theory, there are different uses and contexts for Bogoliubov transformations, in that Bogoliubov transformations are generally used for one of two scenarios. 1. Scattering matrix, where one considers a plane wave sent at some target, then measures a superposition of plane waves after they have scattered off the target. These waves are then related by a Bogoliubov transformation of the type $u^{Out}=au^{In}+bu^{*In}$. That is, it considers the transformation between the same basis, at different times. The Bogoluibov coefficients are then related to the reflection and transmission coefficients. 2. The transformation between two different vacua at the same time, hence the transformation between two different Fock spaces at the same time. Here, one considers the decomposition of the wave function in two different vacua (basis states), so that they have different creation and annihilation operators. That is, they describe the same system from different points of view. Boonserm and Visser's paper considers scenario 1, however, as discussed in paragraph 4 of Section 2A, as well as in Section 2B, of my paper, I am considering the scenario 2. Therefore, the results of Boonserm and Visser's paper do not apply to my paper, since they are considering completely different scenarios for the Bogoliubov transformations.
Minor REVISION comments	Correct grammar, spell names, etc; ex: Bogoliubov's (this is a serious ofence)	According to Appendix B (Correct or preferred spellings of frequently occurring words) of the AIP Style Manual, Fourth Edition, by the American Institute of Physics, both Bogoliubov and Bogolyubov are accepted spellings. Therefore, by the AIP, this spelling is not an offense; in fact it is actually an accepted spelling. I have also seen other variants of the spelling, for example in Birrell and Davies classic textbook "Quantum fields in curved space", they spell his name as Bogolubov. However, I have corrected the spelling to the former.
Optional/Generalcomments	The author presents the quantization of the mesoscopic RLC circuit without source. The system is modeled as a damped harmonic oscillator as it is asserted in introduction, however the treatment bellow is based on on time-dependent harmonic oscillator. The article follows closely the article of I. A. Pedrosa and A. P. Pinheiro "Quantum	The point of the paper was not to simply quantize the Mesoscopic RLC circuit, as this was already done by Pedrosa and Pinheiro, but, as the title of the paper would suggest, to go beyond their paper and consider the occupation number of the quasi-particle production due to the time-dependent nature of the system, as well as consider the Berry phase associated with system as well. Moreover, using the Ermakov equation, one can solve the system exactly without the use of a particular solution to the Mine-Pinney equation. This

	Description of a Mesoscopic RLC Circuit", which is cited as reference [5], the author tries to give the same argument in the case of time-dependent mass. I am not sure this is holds in any circumstances. The author should clearly specify what's new and how this new feature applies to RLC circuit against Pedrosa and Pinheiro work. The article is written in a manner that leaves the impression that the author does not master the multitude of ideas taken from literature. It seems like an ensemble of ideas without a goal. Even so Bogoliubov's name is spelled incorrectly as " Bogolyubov coefficients" The author should be referred to an important study Bounding the Bogoliubov coefficients by Petarpa Boonserm and Matt Visser Ann. Phys. 323: 2779-2798, 2008. Some representative references to research on exactly solvable potentials should be given. These are found on the end of Petarpa and Visser paper and have to be added with the newly found pseudo-Gaussian potential namely: "Exact solution to the Schrödinger's equation with pseudo-Gaussian potential" by Felix Iacob and Marina Lute J. Math. Phys. 56 (12), 121501 and with the general presentation of the class o Harmonic Oscillators namely: "Remarks on the geometric quantization of a class of harmonic oscillator type potentials" by Felix Iacob arXiv preprint arXiv:1607.06630 The article should meet the publication criteria just after these suggested revisions are made.	difference is clearly specified throughout the introduction of the paper. It is clear that the point of the paper is not to just give the same argument in the case of a time-dependent mass (this has also been done by Pedrosa et.al. for a general case where both the mass and frequency are time dependent: C.M.A. Dantas, I.A. Pedrosa and B. Baseia, Phys. Rev. A 45, 1320 (1992)), but to extend Pedrosa and Pinheiro's analysis and provide an experimental method for measurement and predictions. As a side note, when considering the quasi-particle production during gravitational collapse of a Schwarzschild black hole, it is the mass which is time-dependent, not the angular frequency (T. Vachaspati, D. Stojkovic and L. M. Krauss, Phys. Rev. D76 (2007) 024005), hence there are many physically interesting systems which only have a time-dependent "mass" term. The author would completely disagree that the paper is an ensemble of ideas without a goal. It actually has a clear goal and obtains that goal. The goal is that it provides an experimental method and prediction for determining the difference between two different theoretical methods via measurements of the occupation number and Berry phase of the Mesoscopic RLC circuit. As discussed above, the study "Bounding the Bogoliubov coefficients" by Boonserm and Visser does not apply to the paper, since it deals with a different scenario used for Bogoliubov transformations. Since the papers suggested by the reviewer to be cited do not involve time-dependent system (in particular, time-dependent harmonic oscillator), nor involve the mesoscopic RLC circuit, they are not relevant to the current paper. Additionally, since the references found in Boonserm and Visser's paper consider potentials used for scattering, they are also not relevant for the current paper.