

Theoretical Physics Group, Yanga Esguerra Subgroup, Annual Report

(1 January 2012 to 31 December 2012)

Publications in ISI-indexed Journals

1. K.H. Villegas, D.M. Yanga, Josephson Tunneling Current in Spin Polaron Theory, *J. Superconductivity & Novel Magnetism* 25, pp.1873-1877(2012)
2. L.O.S. Co Ting Keh, A.M.A. Chupungco, J.P. Esguerra, Nonlinear Time Series Analysis of Electroencephalogram Tracings of Children with Autism, *Intl. J. Bifurcation & Chaos* 22, Article 1250044 (2012)

Papers Presented in the 2012 Samahang Pisika ng Pilipinas Physics Congress (De La Salle Health Sciences Institute, Dasmaringas, Cavite, 22 to 24 October 2012)

1. K.H. Villegas, J. P. Esguerra, D. Yanga, Finite-temperature Green's Function Approach to Kondo Impurity Scattering
2. M.A. Fudolig, J.P. Esguerra, Apparent Superluminal Motion Of A Revolving Subluminal Body
3. D. Yanga, K.H. Villegas, M. Alcanzare, J.P. Esguerra, Mobility of Charged Particles in Polar Crystals Based on the Spin Polaron Theory
4. J. Cosme, J.P. Esguerra, Ground State Analysis of Tonks-Girardeau Gas in a Harmonic and Gaussian Double-Well Potential by Perturbation Method.
5. M.I. Fudolig, J.P. Esguerra, Tolerance and opinion dynamics.
6. D.L. Dy, J.P. Esguerra, Mass Spectrum of Bosonic Strings with Sink
7. M. Alcanzare, D. Yanga, J.P. Esguerra, Spin-polaron Theory in Kubo Formulation
8. K. Agapito, J.P. Esguerra, Mean Solution of the Noisy Du_{ng} Equation.
9. J.P. Esguerra, E.J. Eisma, M. Alcanzare, Position Probability and Moment Generating Function of Directionally Biased Persistent Random Walk with Pauses
10. K.H. Villegas, Supersymmetry Breaking via Sterile Neutrinos
11. J.T. Acuna, M.R. Solis, Optical Appearance of a Collapsing Object as Seen by a Radially Infalling Observer

Students who Graduated

Enrico Villacorta, MS Physics, 2nd Semester 2011-2012
Thesis: Distribution Functions Associated with Relativistic Boosts and Random Kicks in One Dimension
Adviser: J.P.H. Esguerra

Migel Antonio Catalig, MS Physics, 2nd Semester 2011-2012
Thesis: First Passage Statistics of Modified Polya Urn Processes
Adviser: J.P.H. Esguerra

Melchor Cupatan, MS Physics, 2nd Semester 2011-2012
Thesis: Statistical mechanics and tricritical point of small magnetic systems involving long-range interactions in the microcanonical formalism
Adviser: J.P.H. Esguerra

Kristian Hausser Villegas, MS Physics, 2nd Semester 2011-2012
Thesis: Quantum tunnelling in high-temperature superconductivity using the spin-polaron theory
Adviser: D.M. Yanga

Kendrick Agapito, BS Physics, 2nd Semester 2011-2012
Thesis: Numerical and Analytical Characterization of Selected Noisy 1-D Nonlinear Systems
Awards/Recognitions: cum laude
Adviser: J.P.H. Esguerra

Diane M. Caneso, BS Physics, 2nd Semester 2011-2012
Quantum Revivals in delta-perturbed Infinite Square Wells and 1D Spin Systems
Awards/Recognitions: Best BS Physics Thesis (Leticia Shahani Award)
Adviser: J.P.H. Esguerra

Jayson Cosme, BS Physics, 2nd Semester 2011-2012
Wave Propagation in the Fractional Dispersive Wave Equation, Camassa-Holm Equation and Modified Camassa-Holm Equation
Awards/Recognitions: 1) magna cum laude, 2) Deans Medallion for Most Outstanding BS Physics Graduate (Joker Arroyo Award)
Adviser: J.P.H. Esguerra

Leodegario U. Lorenzo II, BS Physics, 2nd Semester 2011-2012
Dynamics of Exponentially Graded Spring-Mass and Pendulum Systems
Awards/Recognitions: cum laude
Adviser: J.P.H. Esguerra

Cye Tamura, BS Physics, 2nd Semester 2011-2012
Application of the Lagrangian Formulation in Ray Propagation in a medium with a Spherically Symmetric Index of Refraction Profile
Awards/Recognitions: cum laude
Adviser: J.P.H. Esguerra

Students Affiliated with the Research Subgroup

PhD Physics Students (Adviser: J.P.H. Esguerra)

Bhazel Anne Rara Pelicano
Mikaela Irene Fudolig
Michael Reuben Solis
Maria Michiko Alcanzare
Ruby Agnes Alfonso

PhD Physics Students (Co-Advisers: D.M. Yanga, J.P.H. Esguerra)

Kristian Hauser Villegas

MS Physics Students (Adviser: J.P.H. Esguerra)

Niel Caidic
Pecier Paul Decierdo
Leodegario U Lorenzo II
Kendrick Agapito
Diane Caneso
Jayson Cosme
Jeffrey Tare

BS Physics Students (Adviser: J.P.H. Esguerra)

Joseph Carlo Candare
Ephraim Jabneel Eisma
Miguel Antonio Fudolig
Jan Tristram Acuna
Mary Madelynn Nayga
James Vance
Noel Lamsen
Macliing Aydinan
Derrick John Junio

BS Applied Physics Students (Adviser: J.P.H. Esguerra)

Deborah Lumantas

Research Grants

Project Leader: Danilo M. Yanga

Project Title: Mobility of Charged Particles in Polar Crystals Based on the Spin Polaron Theory

Nature of Grant: NIP Research Grant

Duration: 1 January 2012 to 31 December 2012

Project Leader: Jose Perico H. Esguerra

Project Title: Position Probability and Moment Generating Function of Directionally Biased Persistent Random Walk with Pauses

Nature of Grant: NIP Research Grant

Duration: 1 January 2012 to 31 December 2012

**Theoretical Physics Group, Galapon Subgroup Terminal Report
(1 January 2012 to December 31, 2012)**

ISI Publications

D.L.B. Sombillo and E.A. Galapon, "Quantum time of arrival Goursat problem", J. Math. Phys. 53, 043702 (2012).

E.A. Galapon, "Only above barrier energy components contribute to barrier traversal time", Phys. Rev. Lett. 108, 170402 (2012).

SPP Publications (2012)

J. Bunao and E.A. Galapon, "The Time of arrival Operator for the Free Particle Case in the Hilbert Space L from Negative Infinity to Positive Infinity", (Oral presentation).

K.M. Martinez and E.A. Galapon, "Distributional treatment to integrals and applications", (Oral presentation).

M. Flores and E.A. Galapon, "Exact time evolution of a 4-qubit system in a common reservoir and its influence on bipartite entanglement dynamics", (Oral presentation)

E. Paglinawan and E.A. Galapon, "Apparent suppression of quantum observable conjugacy through joint weak measurements", (Oral presentation)

J. Gonzalez, A. Villanueva and E.A. Galapon, "Wavefunction structure and time of arrival", (Oral presentation)

P.J. Blancas, "Quantum scattering of an exactly solvable anisotropic potential in paraboloidal coordinate system", (Oral presentation).

Graduated Students

Jonathan Gonzalez, MS Physics 2012 (Summer)

Thesis: "Asymptotics on the time of arrival expectation value up to quadratic potentials"

Kay Marie Martinez, MS Physics 2012 (First Sem)

Thesis: "Beyond all order asymptotics of integrals by distributional approach and physical applications"

Eliel Paglinawan, MS Physics 2012 (First Sem)

Thesis: "Joint weak quantum measurements on position and kinetic energy"

Marvin Flores, MS Physics 2012 (First Sem)

Thesis: "N-qubit bipartite entanglement dynamics"

Grants

E.A. Galapon (UP-System Grant): “*Beyond all orders asymptotics of the quantum tunneling index of refraction for tall potential barriers and quasi-monochromatic incident wavepackets*”

E.A. Galapon (DOST Grant): “*An Investigation on the Universality of Exponential Superluminality in Quantum Tunneling*”

E.A. Galapon (NIP Grant): “*Asymptotics of quantum time of arrival*”

Students

Herbert Domingo (PhD)

Roberto Vitacol (PhD)

Marvin Flores (PhD)

Phillip Jordan Blancas (MS Physics)

Reseith John Fajardo (MS Physics)

Eilel Paginawan (MS Physics, Graduated)

Marie Kay Martinez (MS Physics, Graduated)

Vladimir Villegas (BS Physics)