March 15, 2015

**Ph. D. COURSE ON SANTILLI ISOMATHEMATICS**

**as a covering of 20th century mathematics**

**Partially supported by the R. M. Santilli Foundation**

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**Schedule for 50 lectures of one hour each**

**Part I:**

**Helmholtz conditions of Variational Self-Adjointness [1a]**

This part is essential to identify quantitatively systems of differential equations representable with 20th century mathematics, such as Lie's theory, and broader equations beyond the descriptive capacities of 20th Century mathematics, thus requiring its structural generalization.

**Part II:**

**Santilli IsoNumbers [2,3]**

This part signals the historical transition form millennia of mathematics based on the simplest possible unit 1 to Santilli's mathematics based on the most general possible left and right unit under the sole condition of being invertible, isomathematics occurring for the particular case when the generalized unit is positive-definite, and known as Santilli isounit.

**Part III:**

**Santilli-Georgiev IsoDifferential Calculus [4,5]**

This part signals the additional historical transition from centuries of mathematics based on the Newton-Leibniz differential calculus to Santilli covering conception of Iso-differential calculus which is crucial for quantitative treatments of variationally non-self-adjoint equations.

**Part IV:**

**Kadeisvili IsoFunctional IsoAnalysis [6,7a]**

This, part, which was initiated by the (late) J. V. Kadeisvili, is crucial for the correct elaboration of Santilli isomathematics and treats the axiom-preserving isotopic lifting of the entire 20th century functional analysis, including trigonometry, Fourier transforms, etc.

**Part IV:**

**The Lie-Santilli IsoTheory [1b,8,9]**

This part is the very hearth of the course since it signals the additionally historical transition from the sole characterization of linear, local/differential and Hamiltonian systems via Lie's theory, to the treatment via the covering Lie-Santilli isotheory of the most general known (non-singular) non-linear, non-local/integral and non-Hamiltonian systems as they occur in the physical reality.

**Part V:**

**Santilli isosymmetries [7b,8-17]**

This part consists of the most important application of the covering Lie-Santilli isotheory, that for the systematic, axiom-preserving, isotopic lifting of "all" spacetime and internal symmetries of 20th century symmetries, and provides the foundations for the scientific and industrial applications achieved to date [21], as well as to new application available, in Santilli's words, "to young minds of any age."

**Part VI:**

**Santilli Isotopies of 20th century geometries [4,7]**

By remembering that geometry provides the ultimate synthesis of nature, this part is crucial for the applications of isomathematics and consists of Santilli isotopies of the Euclidean, Minkowski, Riemannian, Fynslerian, symplectic and other geometries.

**Part VII:**

**The Tsagas,--Falcón-Ganfornina--Núñez-Valdés IsoTopology [19,20]**

By remembering that topology provides the  ultimate formulation of mathematics, this final part deals with the ultimate formulation of Santilli isomathematics as developed by the mathematicians Gr. Tsagas, R. M. Falcón-Ganfornina and J. Núñez-Valdés. Its use is crucial for the mathematically consistent application of Santilli';s isomathematics, such as for the transition from  Newton, Galileo, and Einstein theories that are solely applicable to "massive points" moving in empty space, to Santilli coverings of Newton, Galileo and Einstein theories which  are applicable to extended, non--‐spherical and

deformable masses moving within physical media as occurring for interior conditions of particles, nuclei, molecules, stars, and black holes [21].

**SUGGESTE PRIMARY REFERENCES**

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