

## GRANTS FOR INNOVATIVE RESEARCH ON IRREVERSIBILITY (unsubscribe link at bottom)

During the 20th century it was widely believed that the irreversibility over time of the events in our physical reality, including all energy releasing processes, is "illusory" (sic!) because, according to that theology, when the macroscopic event is reduced to its elementary particle constituents, all irreversibility "disappears" (sic!) and one nicely recovers particles reversible over time that nicely verify Einstein special relativity and quantum mechanics.

The Italian-American physicist **Ruggero Maria Santilli** (see links for his curriculum, prizes and nominations, and scientific discoveries in <http://www.santilli-foundation.org>) proved the following:

*THEOREM: A macroscopic process that is irreversible over time cannot be consistently decomposed into a finite number of elementary particles all reversible over time and, vice versa, a finite number of elementary particles all reversible over time cannot yield a macroscopic irreversible process under the correspondence or any other principle.*

Following half a century of mathematical, physical, chemical, experimental and industrial research, Santilli has provided experimental verifications of the above theorem, by essentially confirming the exact validity of special relativity *in vacuum* as conceived by Einstein, but establishing that *physical media cause interactions not representable with a Lagrangian or a Hamiltonian that are treatable via generalized Minkowskian spacetimes* with expected structural revisions in astronomy and all quantitative sciences.

***Experimental verifications of isoredshift with possible absence of universe expansion, big bang, dark matter and dark energy,***

R. M. Santilli, *The Open Astronomy Journal* Vol. 3, pages 1-20, 2010  
<http://www.santilli-foundation.org/docs/Santilli-isoredshift.pdf>

Our Foundation is current funding with priority the repetition **within physical media** of the historical experiments that established the validity of special relativity **in vacuum**, beginning with the repetition completely underwater of the Fizeau experiment, and then passing to other tests. Qualified scholars from any country are welcome to participate.

The primary objective for all the research indicated in this announcement is to seek much needed **new clean energies and fuels**. Santilli's argument is that *all energy releasing processes are irreversible over time, thus requiring irreversible methods for their consistent quantitative treatment*. The notorious reversibility over time of special relativity and quantum mechanics left no other choice than that of seeking irreversible coverings,

Santilli initiated his scientific journey during the undergraduate studies at the University of Naples and graduate studies at the University of Torino, Italy, during which he studied Lagrange's original works in Italian, saw Lagrange's impossibility of representing the entire universe with a single function today called the Lagrangian, and decided to dedicate his research life to quantitative studies of **interior dynamical problems** (dynamics of extended particles and elm waves moving within physical media), that include irreversibility as one of their numerous features beyond the representational capability of special relativity and quantum mechanics.

The first major problem encountered by Santilli was that the brackets (A, H, F) of the **time evolution of Hamilton's equation with external terms** for an observable A

$$dA/dt = (A, H, F) = [A, H] + F \partial A / \partial r, \quad (1)$$

not only violate all Lie algebras, but they violate the conditions to characterize any algebra. Hence, he looked for a generalization of the Lie product  $[A, B] = AB - BA$  that, to represent irreversibility, should break the invariance of the Lie-product under time reversal (characterized by invariance under anti-Hermiticity), thus not being antisymmetric (or symmetric), while verifying the conditions to characterize an algebra.

Along these lines, Santilli proposed in 1967 [1] the first known **deformation of the Lie product** into the form  $(A, B) = pAB - qBA$ , where p, q, and  $p \pm q$  are fixed non-null scalars, and showed that the new product is jointly **Lie-admissible and Jordan-admissible in the sense of Albert**, i.e., the attached antisymmetric brackets  $[A, B] = (AB) - (BA)$  and the attached symmetric brackets  $\{A, B\} = (A, B)_{+} + (B, A)$  are Lie and Jordan, respectively. In various papers related to his Ph. D. work, Santilli then introduced the following **parametric deformation (he called lifting) of Heisenberg's equations** in their infinitesimal and finite forms

$$i dA/dt = (A, H) = pAH - qHA, \quad (2a)$$

$$A(t) = \exp(Hqt) A(0) \exp(-itpH) \quad (2b)$$

where p and q were intended as an approximation of Lagrange and Hamilton external terms. and irreversibility is guaranteed when p is different than q.

After moving to the USA with his family in summer 1967, Santilli abandoned the field for a decade because Lie-admissible and Jordan-admissible algebras were unknown in the pure mathematics of the time, let alone physics. After joining the Department of Mathematics of Harvard University in 1978 under DOE contracts ER-78-S-02-47420.A000, AS02-78ER04742, DE-ACO2-80ER10651, Santilli resumed his studies on irreversibility and proposed in 1978 the following **general Lie-admissible deformation - lifting of Heisenberg equations** also in their infinitesimal and finite forms

$$i dA/dt = (A, H)^* = ARH - HSA, \quad (3a)$$

$$A(t) = \exp(HSt) A(0) \exp(-itRH) \quad (3b)$$

with corresponding **general deformations of Schrödinger's equations for backward and forward motion**, respectively,

$$(w | E(\text{backw.}) = (w | R H, \quad H S | w) = E(\text{forw.}) | w) \quad (4)$$

where now R, S and  $R \pm S$  are fixed nonsingular and *nonsymmetric* matrices, with interconnecting conjugation c

$$R = S^c \quad (5)$$

e.g.,  $c$  is given by transposed (or Hermitian conjugation) and the product  $(A, B)^*$  is also jointly Lie-admissible and Jordan-admissible, although in a generalized way of isotopic character per our Second Announcement

<http://www.santilli-foundation.org/Announcement-2.html>

Also in his original works of 1978, Santilli: proved that the classical image of Eqs. (3) does indeed represent Lagrange and Hamilton external terms **thus assuring irreversibility ab initio**, e.g., from the nonsymmetric character of the  $R$  and  $S$  matrices; set the foundations of the Lie-admissible covering of Lie's theory still valid today; and proposed Eqs. (3)-(5) at the foundation of the **irreversible Lie-admissible branch of hadronic mechanics** [3,23], subsequently extended to **hadronic chemistry** [9]. The case  $R = S = T$  characterizes the generally reversible **isotopic branch of hadronic mechanics and chemistry** of our Second Announcement with  $H$  and  $T$  representing potential and nonpotential interactions, respectively.

The above proposal received a rather vast attention with contributions from numerous mathematicians, physicists and chemists from various countries that, in the past three decades, saw five *Workshops on Lie-admissible Formulations*, eighteen *Workshops on Hadronic Mechanics* and two *International Conferences in Lie-admissible formulations*, resulting in thousands papers, some 30 or so monographs, and about 60 volumes of proceedings for over 20,000 pages of research published in refereed conduits in all developed countries.

A most salient aspect is the identification by Santilli in the 1980s of the fact that both generalized time evolutions (2) and (3) are nonunitary, thus verifying the **Theorems of Catastrophic Mathematical and Physical Inconsistencies of Noncanonical and Nonunitary Theories** [6] (for reviews, Section 1.5. Vol. I of Ref. [23] or Section 3.9 of Ref. [24]).

The resolution of these inconsistencies required major efforts conducted over decades, and produced a basically new mathematics with a bimodular structure and inequivalent mathematical orderings to the right and to the left (physically interpreted as forward and backward in time), which is today known as **genomathematics**, the prefix "geno" being used to induce new axioms (as compared to the prefix "iso" in our Second Announcements).

Santilli's most salient contributions to date include: the discovery in 1993 [2] of his **genonumbers** that incorporate a time ordering in the basic unit and multiplications while (quite remarkably) verifying the axioms of a numerical field; the discovery of **genofunctional analysis, genodifferential calculus and genogeometries** in monographs [3] of 1995 and memoir [4] of 1996 that signed the achievement of a preliminary, yet sufficient mathematical maturity; the first achievement [5] known to us of a time invariant formulation of the most general possible Lie-admissible deformations on genospaces over genofields that bypasses the inconsistency theorems; the most general available formulation of the **Lie-admissible theory** in memoir [6] of 2006; the first application [7] known to us of Lie-admissible formulation to a basically **new, clean "intermediate controlled fusions** [7] for which most of the studies were conducted; the construction of the **isoscattering and genoscattering theories** [8] for irreversible scattering events; and the first known application [9] known to us of Lie-admissible hadronic chemistry to **irreversible chemical reactions** that allowed the discovery of the new chemical species

of **Santilli magnecoles** realized in the clean burning *magnegas* now in production and sale by publicly listed companies the world over (see [www.magnegas.com](http://www.magnegas.com)).

By apologizing for our necessarily discriminatory listing due to the vastity of the literature in the field, among a large number of independent physical contributions in **hadronic mechanics** besides its origination by **R. M. Santilli**, we mention: the first known application in 1978 of Lie-admissible algebras to statistical mechanics by **J. Fronteau and A. Tellez Arenas** of the University of Orleans, France, as well as additional contributions by **I. Prigogine** et al. of the University of Texas at Austin, reproduced in the collected works edited by **A. Schoeber** [10]; the first known application in 1978 of Lie-admissible algebras to particle physics by **S. Adler** [11] of the Institute for Advanced Studies in Princeton; the first known application of Lie-admissible algebras to interior astrophysical bodies by **J. Ellis** et al. [12] of CERN, Geneva; the first known proof of the direct compatibility of Lie-admissible mechanics with thermodynamical laws by **J. Dunning-Davies** [13]; and other important contributions by numerous others physicists, including: **R. Mignani** of the Prima Universita' of Rome, Italy; **A. Jannussis** et al. of the University of Patras, Greece; **A. O. E. Animalu**, of the University of Nsukka, Nigeria; **S. Okubo** of Syracuse University, U.S.A.; **T. Gill** of Howard University, U.S.A.; **M. Nishioka** of Yamaguchi University, Japan; **Y. Ylamed** of the Soreq Center in Israel; **P. Caldirola** of the University of Milan, Italy; **A. K. Aringazin** et al. of Eurasia University in Kazakhstan; **J. V. Kadeisvili** from Georgia, Russia; **J. Kalnay** of IVIC, Venezuela; **H. Rauch** of the Atominstitut, Ausria; **N. Tsagas** of the University of Xhanti, Greece; **I. Gandzha** of the Ukraine Academy of Sciences; **R. Trostel**, of the University of Berlin, Germany; **H. Wilhelm** of the IBR, Florida, U.S.A; **Yu. Arestov** of the Laboratory for High Energy Physics in Protvino, Russia; **M. Sacerdoti** of Milan, Italy; and numerous other physicists (see the *General Bibliography* in Vol. I of Refs. [23]).

In regard to contributions in **hadronic chemistry**, besides its origination by **R. M. santilli**, we mention: **D. D. Shillady** of the Department of Chemistry of Virginia Commonwealth University, U.S.A.; **A. K. Aringazin**, **M. G. Kucherenko** and **M. B. Demenov** of Eurasia University, Kazakhstan; **M. O. Cloonan** of the Department of Chemistry of the Galway-Mayo Institute of Technology, Ireland; **R. Perez-Enriquez**, **J. Luis Marin** and **R. Riera** of the Department of Chemistry of Universidad de Sonora, Mexico; **C. Illert** of the Science-Art Research Cnter in Australia; **D. Day** of the Georgia Institute of Technology, U..S.A; **J. Crate** of FAI Materials Testing Laboratory, Georgia; **M. Schneider** of the IBR in Florida, U.S.A; The IBR technicians **T. Judy**, **G. West**, **M. Rodriguez**, **J. West**, **R. Jones**, and numerous others.

The contributions by mathematicians in the construction of **iso-, geno- and hyper-mathematics** besides their origination by **R. M. Santilli**, are numerous. We restrict ourselves to indicate that these studies were pioneered by the mathematicians **H. C. Myung** of the University of Northern Iowa in Cedar Falls (see his five volume of collected works [14]); **M. L. Tomber** of Michigan State University (see his important *General Bibliography and Index on Nonassociative Algebras* [15]; **S. Okubo** of Syracuse University, U.S.A.; **T. Bhadra Man** of University Kathmandu in Nepal; and others. Additional important contributions were made by the mathematicians: **C.-X. Jiang**, of Academia Sinica, Beijing, China [2b]; **Gr. T. Tsagas**, Chairman of the Department of Mathematics of Thessaloniki University, and **D. S. Sourlas**, from the University of Patras, Greece [16]; **J. Lohmus**, **E. Paal**, and **L. Sorgsepp**, of the Estonia Academy of Sciences [17]; **R. M. Falcon Ganfornina**, and **J. N. Valdes Nunez**, of the Department of Mathematics of the University of Seville, Spain [18]; **C.-X. Jiang** of Academia Sinica in China, author of the first systematic study on Santilli isonumbers p19]; **J. V. Kadeisvili** from Georgia,

Russia, author of numerous works (see, e.g., the excellent monograph [20]);. **Vougiouklis** [21] of the University of Xhanti, Greece, and **B. Davvaz** [22] of Teheran University, Iran, for basic studies on the *multi-valued hyperstructural generalization of the Lie-admissible formulations* here reported (see also Vol. III of Ref. [23]. Additionally, we should mention important contributions by the following mathematicians: **K. M. MacCrimmon, J. V. Kadeisvili, A. K. Aringazin, A. Kirhukin, R. H. Ohemke, G. F. Wene, G. M. Benkart, J. M. Osborn, D. J. Britten, D. B. Lin, P. Broadbridge, P. R. Chernoff, J. Sniatycku, S. Guiasu, E. Prugovecki, A. A. Sagle**, and others (see the 52 pages long *General Bibliography* in Vol. I of Refs. [23]).

A technical review of all the above studies is provided by Santilli's five volumes [23]. A review of the mathematical, physical, chemical and industrial aspects in a language accessible to the general educated audience is available in Ref. [24].

### **THIRD INTERNATIONAL CONFERENCE ON LIE-ADMISSIBLE TREATMENTS OF IRREVERSIBLE PROCESSES**

Scientists working on irreversible processes will gather at an international conference in Nepal from January 3 to 7, 2011, with arrival, if so desired, on December 30, 2010, to spend the New Year Eve together at the foothill of the Himalaya. See the announcement <http://www.santilli-foundation.org/docs/LA-Conference.doc>

Participants should send their application and talk summary via email to: Prof. R. M. Santilli, [ibr@verizon.net](mailto:ibr@verizon.net) for the American Continent; Prof. C. Corda, [cordac.galilei@gmail.com](mailto:cordac.galilei@gmail.com) for Continental Europe; and to Prof. T. Bhadra Man [tuladhar2@hotmail.com](mailto:tuladhar2@hotmail.com) from the rest of the world. Auditors are welcome to participate, but the sole admitted speakers are those with studies that are *structurally irreversible over time* in mathematics, physics, chemistry, biology, engineering and other quantitative fields.

### **RESEARCH GRANTS**

We encourage interested scientists to apply for research grants in the following fields:

**Mathematics:** The Lie-admissible invariant genomathematics has been primarily developed by physicists for physical needs. Most mathematical treatments of Lie-admissible algebras are on conventional spaces over conventional fields [14,15] thus requiring a reformulation on genospaces over genofields or another invariant reformulation to be used in physics. Numerous fundamental mathematical problems also exist, such as the construction of irreversible geometries for interior gravitational problems initiated in Refs. [4,6], such as nonsymmetric deformations of Riemannian metrics on genofields to embed irreversibility ab initio; the completion of the construction of the Lie-admissible covering of the Lie-Santilli isothory [16-18] initiated in Refs. [3,4,6]; construction of the Lie-admissible covering of Ganfornina-Nunez isotopology [18]; and other open mathematical problems..

**Physics:** Santilli Lie-admissible liftings of classical and operator Hamiltonian mechanics are directly compatible with thermodynamics [13]. Additional studies in this important field are encouraged. Further Lie-admissible studies on interior dynamical problems are also encouraged. including an irreversible formulation of particle physics, beginning with the completion and application of the Lie-admissible lifting

genoscattering theory of Refs. [8]; and other intriguing open problems.

**Chemistry:** Chemical reactions are notoriously irreversible over time. To prevent violations of causality and other basic laws by the notoriously reversible quantum chemistry, it is important to achieve a consistent irreversible formulation of chemical reactions via the Lie-admissible branch of hadronic chemistry [9]. Lie-admissible treatments of the irreversible formation of the new chemical species of Santilli magneclules [loc. cit.] are also welcome.

**Engineering:** While nuclear fission can be described via quantum mechanics with good approximation, nuclear fusions are structurally irreversible and their treatment via the notoriously reversible quantum mechanics leads to known inconsistencies. Studies on the engineering realization of hadronic laws for nuclear syntheses [7] are welcome jointly with other irreversible projects.

To apply for support, it is necessary to email a ONE SINGLE PAGE SUMMARY to board@santilli-foundation.org and allow at least two months for comments. Contracts for accepted research are prepared thereafter. Funds are available for the above specified research to all scientists on a worldwide basis irrespective of their ethnic, political, or other character. Dr. Santilli can be reached for technical issues at his email ibr@verizon.net.

## MAIN REFERENCES

- [1] R. M. Santilli, Nuovo Cimento Vol. 51, 570 (1967),  
<http://www.santilli-foundation.org/docs/Santilli-54.pdf>
- [2] R. M. Santilli, Algebras, Groups and Geometries Vol. 10, 273 (1993),  
<http://www.santilli-foundation.org/docs/Santilli-34.pdf>
- [3] R. M. Santilli, *Elements of Hadronic Mechanics*, . Ukraine Academy of Sciences, Kiev, 1995, I & II,  
<http://www.santilli-foundation.org/docs/Santilli-300.pdf>  
<http://www.santilli-foundation.org/docs/Santilli-301.pdf>
- [4] R. M. Santilli, Rendiconti Circolo Matematico Palermo, Suppl. Vol. 42, 7-82 (1996), entire issue dedicated to iso-, geno and hyper-mathematics under the editorship of P. Vetro,  
<http://www.santilli-foundation.org/docs/Santilli-37.pdf>
- [5] R. M. Santilli, "Invariant Lie-admissible formulation of quantum deformations,"  
Found. Phys. Vol. 27, 1159- 1177 (1997)  
<http://www.santilli-foundation.org/docs/Santilli-06.pdf>
- [6] R. M. Santilli, "Lie-admissible invariant representation of irreversibility for matter and antimatter at the classical and operator levels," Nuovo Cimento B Vol. 121, 443 (2006),  
<http://www.santilli-foundation.org/docs/Lie-admiss-NCB-I.pdf>
- [7] R. M. Santilli, "The Novel "Intermediate controlled Nuclear Fusion:" a progress report on its engineering realization according to hadronic mechanics, Hadronic Journal Vol. 31, page 115 (2008),

<http://www.i-b-r.org/CNF-printed.pdf>

[8] R. M. Santilli et al, Nonunitary-isounitary scattering theory of hadronic mechanics, Papers I., II., III  
<http://www.santilli-foundation.org/Isoscattering.html>

[9] R. M. Santilli, *Foundations of Hadronic Chemistry, with Applications to New Clean Energies and Fuels*, Kluwer Academic Publishers (2001),  
<http://www.santilli-foundation.org/docs/Santilli-113.pdf>

[10] A. Schoeber, Editor, *Irreversibility and Nonpotentiality in Statistical Mechanics*, Hadronic Press (1984),  
<http://www.santilli-foundation.org/docs/Santilli-110.pdf>

[11] S. Adler, Phys. Rev. Vol. 17, p. 3212 (1978)

[12] J. Ellis, N. E. Mavromatos and D. V. Nanopoulos in *Proceedings of the Erice Summer School, 31st Course: From Superstrings to the Origin of Space-Time*, World Scientific (1996).

[13] J. Dunning-Davies, Progress in Physics Volume 4, p. 24 (2006).  
<http://www.santilli-foundation.org/docs/Dunning-Davies.pdf>

[14] H. C. Myung, Editor, *Mathematical Studies on lie-admissible Algebras*, Volumes I, II, III, IV, and V, Hadronic Press (1985-1987).

[15] Tomber *Bibliography and Index in non-Associative Algebras*, Volumes I, II, III, Hadronic Press (1986), <http://www.santilli-foundation.org/docs/Tomber.pdf>

[16] D. S. Sourlas. and G. T. Tsagas. *Mathematical Foundation of the Lie-Santilli Theory*. Ukraine Academy of Sciences 1993,  
<http://www.santilli-foundation.org/docs/santilli-70.pdf>

[17] J. Lohmus, E. Paal, and L. Sorgsepp, *Nonassociative Algebras in Physics*. Hadronic Press 1994,  
<http://www.santilli-foundation.org/docs/Lohmus.pdf>

[18] R. M. Falcon Ganfornina. and J. N. Valdes Nunez. *Fundamentos de la Isoteoria de Lie-Santilli*. International Academic Press 2001,  
<http://www.i-b-r.org/docs/spanish.pdf>

[19] C.-X. Jiang. *Foundations of Santilli Isonumber Theory*. International Academic Press (2001), <http://www.i-b-r.org/docs/jiang.pdf>

[20] J. V. Kadeisvili, *Santilli's Isotopies of Contemporary Algebras, Geometries and Relativities*, Ukraine Academy of Sciences, Kiev 1997. Second edition,  
<http://www.santilli-foundation.org/docs/Santilli-60.pdf>

[21] R. M. Santilli and T. Vougiouklis, *Isotopies, genotopies and hyperstructures and their applications*, in *New Frontiers in Hyperstructures*, International Academic Press (1996)  
<http://www.santilli-foundation.org/docs/Vougiouklis.pdf>

[22] B. Davvaz, *Hyperrings Theory and Its Applications*. International Academic Press (2008),  
<http://www.santilli-foundation.org/docs/Davvaz.pdf>

[23] R. M. Santilli, *Hadronic Mathematics, Mechanics and Chemistry*, Volumes I, II, III, IV, and V, International Academic Press, (2008),  
<http://www.i-b-r.org/Hadronic-Mechanics.htm>

[24] R. Anderson, M. Cloonan and I. Gandzha, *New Sciences for a New Era" Mathematical, Physical and Chemical Discoveries of Ruggero Maria Santilli*, in preparation, preliminary html version at  
<http://www.santilli-foundation.org/santilli-scientific-discoveries.html>

### **PAST AND CURRENT GRANTS**

Past and ongoing funded research can be partially seen in the website  
<http://www.santilli-foundation.org/research-grants.html>

### **UNSUBSCRIBE**

To unsubscribe, please send a request to [sf-list-request@santilli-foundation.org](mailto:sf-list-request@santilli-foundation.org) with the word 'unsubscribe' in the "Re:" section

### **SUBSCRIBE**

To subscribe, please send a request to [sf-list-request@santilli-foundation.org](mailto:sf-list-request@santilli-foundation.org) with the word 'subscribe' in the "Re:" section

Yours, Truly

### **Richard Anderson**

Trustee

The R. M. Santilli Foundation

<http://www.santilli-foundation.org/>

email for proposals

[board@santilli-foundation.org](mailto:board@santilli-foundation.org)

### **APOLOGIES**

The Foundation apologizes to recipients in the event they receive this message by mistake caused by continuous upgrading of the enlist. In this instance, recipients are kindly requested to unsubscribe via the above easy link.