

Seminar: "Geometry&Physics", DFT (IFIN-HH)
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Location: IFIN-HH, DFT seminar room

Date: Friday, June 7, 2019, 11:00 AM

Title: **Infons and Energons, the two sides of a String**

Speaker: **Ovidiu Pasarescu** (IMAR)

Abstract: In String Theory (a, mainly, mathematical theory these days, aiming to unify the Standard Model and Relativity in Physics, essentially taking into account the development of the Relativity Theory starting with an elementary particle, the Graviton, not yet experimentally discovered) a string is a tiny vibrating chord giving, function of its vibrations all the elementary particles (and antiparticles). In order to give a specific elementary particle (as photon, or graviton) the string must vibrate (so it needs energy) in some way - amplitude, frequency,...(so it needs information). We arrive as seeing the string as a combination of two formal particles, already considered in the literature, namely the "energon" and the "infor" (in fact, inseparable, like the two faces of a coin), see [S]. We consider here a model of the infons (see [GN]), mathematically based on the Non-standard Analysis in Topoi (the notion of Topos has been initially introduced by A. Grothendieck in Algebraic Geometry, see [RAI]). The non-standard extensions of topoi (the space where we consider that the infons live) have an intrinsic logic which is a conservative extension (as the non-standard analysis of A. Robinson is, see [RAb]) of the intuitionistic logic (multi-valued, specific to topoi), see [P], as the logic of infons is (see [GN]). We apply this model for an understanding of the human brain (where the consciousness is intuitionistic, and the union between subconsciousness and consciousness is a conservative extension of consciousness). We also apply the model in order to understand the empty space, considered as containing energy and information (in fact containing "virtual particles/antiparticles"=strings which appear in pairs from nothing and shortly the pairs cancel themselves); both information and energy are related to the second Principle of Thermodynamics, via Entropy (see [S]). We add that this model is based on a kind

of Quantum Physics based on truth values of propositions instead of probabilities (the model has been already considered in Physics (see [DI], [F]), but without the non-standard extension). Moreover, the quantum intuitionistic logic is considered to be the analogue of the quantum logic, but in a quantum (Everett, or Tegmark rank 3) multiverse (see [T]), considered here as the right environmental space.

REFERENCES:

- [DI] DORING, Andreas, ISHAM, Chris, Classical and Quantum Probabilities as Truth Values, J.of Math. Phys. 53(2012), (<https://arxiv.org/pdf/1102.2213.pdf>)
- [F] FLORI, Cecilia, Lectures on Topos Quantum Theory, Graduate course, Waterloo, 2012 (<https://arxiv.org/pdf/1207.1744.pdf>)
- [GN] GUREVICH, Yuri, NEEMAN, Itay, The Logic of Infons, 2009, DOI: 10.1145/1877714.1877715 (<https://www.researchgate.net/publication/228922140> The Logic of Infons)
- [P] PALMGREN, Erik, Semantic of Intuitionistic Propositional Logic, LN for Appl. Logic, 2009 (www2.math.uu.se/~palmgren/tillog/heyting3.pdf).
- [RAI] RADU, Alexandru, Teoria toposurilor, vol. 1-2, Ed. Acad. RSR, 1986, 1987.
- [RAb] ROBINSON, Abraham, Non-standard Analysis, Princeton Univ. Press, 1966.
- [S] STONIER, Tom, Information and the Internal Structure of the Universe, Springer-Verlag, 1990.
- [T] Tegmark, Max, Our Mathematical Universe, 2013 (Romanian translation, Ed. ASCR Cluj-Napoca, 2014).