

Abstract Submitted
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Physics as Information GIACOMO MAURO D'ARIANO, Università di Pavia — The experience from Quantum Information has lead theorists to look at Quantum Theory and the whole Physics from a different angle. A new information-theoretic paradigm is emerging, long time ago prophesied by John Archivald Wheeler with his popular coinage “It from bit.” Theoretical groups are now addressing the problem of deriving Quantum Theory from informational principles, and similar lines are investigated e.g. in new approaches to Quantum Gravity. In my talk I will review some recent advances on these lines. The general idea synthesizing the new paradigm is that there is only Quantum Theory (without quantization rules), and the whole Physics—including space-time and relativity—is emergent from the quantum-information processing. And, since Quantum Theory itself is made with purely informational principles, the whole Physics must be reformulated in information-theoretical terms. The review is divided into four parts: a) Very short review of the informational axiomatization of Quantum Theory; b) How space-time and relativistic covariance emerge from the quantum computation; c) What is the information-theoretical meaning of inertial mass and Planck constant, and how the Dirac field emerges; d) Observable consequences of the new theory. I will then conclude with some possible future research lines.

Giacomo Mauro D'Ariano
Università' di Pavia

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