Spacetime and Factuality: The physics that makes the quantum become local while satisfying Bell's inequality.

Sánchez-Kuntz, Natalia[§]; Nahmad-Achar, Eduardo[*]

Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México

Apdo. Postal 70-543 Mexico D. F., C.P. 04510

(Dated: February 29, 2016)

Abstract

By embeding the Quantum Mechanics' mathematical building in a spacetime hipersurface and assuming local realism, we get the emergent tools for a factual hidden-variable theory which is in accordance with the no-go theorems: in particular, we demonstrate that the predictions made with these tools do not violate Bell's inequality. Based on the notion of ontological states proposed by 't Hooft, we construct a factual theory with complete and realistic descriptions of a state of a quantum system and with deterministic evolution operators that take us from ontological states to ontological states. By doing so, we also recover the Quantum Mechanics' probabilistic predictions due to incomplete knowledge of the concerning system. In this way we show that Quantum Mechanics can indeed have a local interpretation, and meet with the Theory of Relativity in a satisfying way.

[§] nohaynat@gmail.com

[*] nahmad@nucleares.unam.mx