THE PRINCIPLE OF GENERAL TOVARIANCE

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Abstract. We propose a new principle of physics and especially quantum gravity. This principle states that physical laws should look the same in whatever topos they are defined (a topos is a generalization of the category of sets). This principle is partly inspired bythe recent topos-theoretic approach to physicsformulated byIsham & Doering, although the earlier explicit construction of quantum mechanics byIsham & Butterfield fails to satisfy it for technical reasons. Another source of inspiration has been recent unpublished work by the emerging "Nijmegen school" of topos physics, consisting of Chris Heunen, Bas Spitters and the speaker. Finally, the speaker's own past work on the functoriality of quantization played a role, which principle should emerge as a special case of tovariance. The talk contains an introduction to topos theory and will be comprehensible to any mathematical physicist who isn't afraid of categories and functors.

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