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Geometry, Integrability and Quantization

THE ELASTICITY OF QUANTUM SPACETIME FABRIC

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Abstract. The present paper aims to emphasize the geometrical features of the quantum spacetime, considering gravity as an emergent feature similar to the elasticity of the solid state. A small scale structure is needed to explain the emergent gravity and how spacetime atoms are continuously created in the process of the expansion of the universe. A simple geometrical model has been introduced.

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1. Introduction

After 10 years of hard work, Einstein has succeeded to construct a General Theory of Gravity. He has started from Riemann achievements into the differential geometry. He has developed the tensor calculus and eventually put his well-known equations on paper [3]. His stem work created a plethora of very technical scientific papers written by many renown and high class physicists. The central idea is that the notion of gravitational force is replaced by the curvature of the spacetime fabric. The surface of the spacetime fabric is curved in the presence of mass. "The mass tells to spacetime how to curve and the curved spacetime tells to the body bearing this mass how to move". This is not so easy to deal with. Firstly, Einstein made a strong and strange assumption: the space time is not only a mathematical tool, anymore. Actually the spacetime is a real object with structure and properties which can be study in the frame of physics. Confident with this assumption, Einstein went further and has predicted a lot of things, the gravitational waves being one of the most interesting predictions. The quest for the gravitational wave has lasted long time. Actually, it lasted decades. During this time, skeptical voices had risen but when the necessary technology did appear in 2015, the gravitational