Hyper-finite factors and dark matter hierarchy

This book discussed a vision about physical role of von Neumann algebras known as hyper-finite factors of type II_1 providing a possible realization for the notion of finite measurement resolution in TGD framework. Also a view about dark matter hierarchy based on a hierarchy of Planck constants realized in terms of space-time geometry is proposed. This involves also application of p-adic length scale hypothesis.

The first part of the book is devoted to hyper-finite factors and hierarchy of Planck constants.

1. The Clifford algebra of WCW is hyper-finite factor of type II_1 which suggests that M-matrix could be identifiedi n terms of Connes tensor product.

2. In TGD framework dark matter corresponds to ordinary particles with non-standard value of Planck constant coming as integer multiple of the ordinary Planck constant. Dark matter could be in quantum Hall like phase localized at light-like 3-surfaces with macroscopic size and analogous to black-hole horizons.

Second part of the book is devoted to the application of p-adic length scale hypothesis and dark matter hierarchy above elementary particle length scales. The so called leptohadron physics, originally developed on basis of experimental anomalies, is discussed as a particular instance of an infinite fractal hierarchy of copies of standard model physics, predicted by TGD and consistent with what is known about ordinary elementary particle physics. TGD based view about nuclear physics involves light exotic quarks as a essential element, and dark nuclear physics could have implications also at the level of condensed matter physics and biology. TGD based view about high T_c superconductors involves also in an essential manner dark matter and is summarized in the closing chapter.