ON GEOMETRIC PROBABILITY, HOLOGRAPHY, SHILOV BOUNDARIES AND THE FOUR PHYSICAL COUPLING CONSTANTS OF NATURE

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By recurring to Geometric Probability methods, it is shown that the coupling constants, alpha_{EM}; alpha_{W}; alpha_{C} associated with Electromagnetism, Weak and the Strong (color) force are given by the ratios of the ratios of the measures of the Shilov boundaries Q_2 = S^1 x RP^1; Q_3 = S^2 x RP^1; S^5 , respectively, with respect to the ratios of the measures associated with the 5D conformally compactified real Minkowski spacetime and that has the same topology as the Shilov boundary Q_5 of the poly-disc D_5. The homogeneous symmetric complex domain D_5 = SO (5, 2) / SO (5) x SO (2) corresponds to the conformal relativistic curved 10-real-dimensional phase space associated with a particle moving in the 5D Anti de Sitter space AdS_5. The geometric coupling constant associated to the gravitational force can also be obtained from the ratios of the measures involving Shilov boundaries. We also review our derivation of the observed cosmological vacuum energy density based on the geometry of de Sitter (Anti de Sitter) spaces.