Review of "The statistical origins of gauge coupling and spin" by U. Klein (AFdB n°722).

This paper is a generalization of a previous work, where he derived Schrödinger equation from statistical assumptions. In the present work, he extended that to three dimensions, to gauge fields through electrodynamic potentials and spin half-one. This article shows that it is possible to obtain the Pauli question from statistical hypothesis as it was done in a previous paper for Schrödinger equation.
The paper is original and interesting, in particular, with the deduction of a purely quantum terms in Madelung's (equations 56-57) and Takabayasi (equation 96) from a new least action principle (equations 49-50 and 87-88). That's the reason this article might be published. However, it is necessary to take into accounts some remarks which are listed below :

1/ In the section 8, the author states that the classical limit of Schrödinger equation is given by the equations 102 and 103. This convergence is not right as it has been shown recently for coherent states [1][2]. However it is right for undiscernable semi-classical case[1][2].

2/ The author shows that it exists an interpretation in which a quantum mechanical problem can be considered as a statistical ensemble of particles. Since the velocity field is given by the equations 4 or 72, one has to link between the third theory type and the De Broglie-Bohm which considers the same veolicity fields.

3/ Since the author has used the assumptions 4 and 5, and due to the fact that the De Broglie-Bohm Theory has a statistical interpretation, one knows since the beginning of the paper, that it exists L_0 equal to the quantum potential. However, the variational principle which permits to obtain naturally this quantum potential, is very original.

4/ The principle of maximal disorder which is cited by the author in sections 5 and 7, is not linked to Fisher's minimal information principle, but is related to a variational principle, corresponding to a generalization of the least action principle (equations 47-48 and 87-88). This principle should be more raised and discussed.

[1] M. Gondran, A. Gondran, "*Discerned and non-discerned particles in classical mechanics and convergence of quantum mechanics to classical mechanics*", Annales de la Fondation Louis de Broglie, vol. 36, 2011.

[2] M. Gondran, A. Gondran, "*The two limits of the Schrödinger equation in the semi-classical approximation: discerned and non-discerned particles in classical mechanics* ", FPP6, Växjö, Suède Juin 2011, to appear in Foundations of Probability and Physics-6, AIP Conference Proceeding. [ArXiv:1107.0790 (quant-ph)]