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We discuss some points from the analysis of a predicative model of quantum states by sequents [2, 3]. The model introduces logical constants from equations between assertions, considering basic assertions from quantum mechanics. This provides a new interpretation of logical constants, in physical terms. In particular, the universal quantifier describes pure quantum states, the linear falsum and linear negation are discussed in terms of the spin observables and the related quantum uncertainty. Moreover, one could model quantum entanglement, overcoming the usual multiplicative parallelism, by adopting an infinitary view of first order domains and then extending the quantifiers to a symmetric predicative link.

The model helps to rethink the standard notions of first order variable, term and first order quantifier, fixed by the analytic tradition, before the birth of quantum physics (for the necessity to rethink the analytic tradition in the logical formalization, we quote e.g. Girard's work and [1]), and allows to read a deep relation between logical incompleteness and physical incompleteness. For, in the model, mixed states, rather than pure quantum states, can be obtained by "omega-rules" rather than by standard first order rules. Equivalently, characterizing a term, as a closed term or as a variable, is sensitive to the the gap induced by quantum measurement, that can be read as the gap between the meta-level and the object level. In particular, a closed term could be interpreted as a random variable at the metalevel. A further consequence is the validity of Gentzen's structural rules in relation with the existence and choice of such a gap. In particular structural rules can be introduced by means of variables, rather than by modalities, as in the approach of linear logic.

[1] T. Achourioti and M. van Lambalgen, *A formalization of Kant's transcendental logic*, ***The Review of Symbolic Logic***, vol. 4 (2011), pp. 254–289.

[2] G. Battilotti, *Characterization of quantum states in predicative logic*, ***International Journal of Theoretical Physics***, vol. 50 (2011), pp. 3669–3681.

[3] G. Battilotti, *Quantum states as virtual singletons: converting duality into symmetry*, ***International Journal of Theoretical Physics***, vol. 53 (2014), pp. 3488–3502.