

Topological quantum computation (TQC) or more generally, a TQC-like process (to be referred as TQC), is one possible application of TGD. The latest article summarizes the recent number theoretic view about TQC in TGD inspired biology. There are several new physics elements involved. Mention only the notion of many-sheeted space-time involving the notions of electric and magnetic body; the new view about quantum theory relying on the  $M^8 - H$  duality relating number theoretic and geometric views about physics and predicting the hierarchy of effective Planck constants assignable to a hierarchy of extensions of rationals; cognitive representations as unique discretization of space-time surface realizing generalized quantum computationalism; and zero energy ontology (ZEO) suggesting a new vision about quantum error correction. Quantum gravitation plays a key role in the proposal.

The engineering aspects of TQC were not discussed. The question that inspired this article was whether classical computation which relies strongly on non-equilibrium thermodynamics, could provide guidelines to end up with a more detailed view.

This led to a proposal in which p-adic thermodynamics assigned with the TGD based description of spin glasses would play a key role. TQC would involve quantum annealing in the spin glass energy landscape for the fermion states associated with flux tube structures. Anyons would be replaced with representations of the Galois group.

Physical states are however Galois singlets and many fermion states would involve entanglement between irreps of (relative) Galois group associated with spin *resp.* momentum degrees of freedom and give rise to a superposition of Galois singlets. The state function reduction ending TQC would project a tensor product of a given irrep from this superposition.

The entanglement between representations should be engineered in such a manner that the desired outcome of TQC would have the largest entanglement probability. p-Adic thermodynamics could give the entanglement probabilities. A connection with the travelling salesman problem emerges besides the connection with the factorization of the Galois group to prime factors appearing as relative Galois groups, which are simple (prime).