

# TEN COMMANDMENTS OF THE CHURCH OF THE SMALLER HILBERT SPACE

With apologies to John Smolin and, of course, God.

1. I am  $\rho$ , your state, who brought you out of wavefunction realism, the place of orthodox dogmatism.
2. Do not have any other states except Me. Do not represent states by false purifications, conceived as ontological states of the Platonic forms above, of reality below, or of the space-time foam underlying reality. Do not bow down to such states or worship them. I am  $\rho$  your state, a state that demands exclusive belief.
3. Do not announce your state  $\rho$  in vain.  $\rho$  will not allow the one who announces it in vain to go unpunished by a Dutch bookie.
4. Remember the CP-map  $\mathcal{E}$  to keep dynamics meaningful. You can work things out using six different Kraus decompositions or Steinspring dilations and do all your tasks. But the CP-map  $\mathcal{E}$  is an equivalence class to  $\rho$  your state. Do not do anything that attaches meaning to the arbitrary tools you choose to work with. This includes your Hilbert Space basis  $\{|j\rangle\}$ , your purifications  $|\Psi\rangle$ , your Kraus decompositions  $\{E_j\}$ ,  $\mathcal{E}(\rho) = \sum_j E_j \rho E_j^\dagger$ , your Steinspring dilations  $U, U^\dagger U = U U^\dagger = I$ , your Naimark extensions  $P_j, P_j P_k = \delta_{jk} P_j$ , your path integral decompositions and your virtual particles. It is for perturbation theory calculations in QED that  $\rho$  is supplemented by the Feynman diagrams, the path integrals, the Greens functions, and all that is in them, but the true evolution of  $\rho$  rests on the CP-map.  $\rho$  therefore blessed the CP-map  $\mathcal{E}$  and made it meaningful.
5. Honor your forefathers by using the Hilbert space algorithm they handed down to you to calculate your expected utilities. You will then live long on the land that  $\rho$  your state describes your beliefs about.
6. Do not commit murder, since there is no other “branch of the wavefunction” in which your victim will survive.
7. Do not adulterate the Schrödinger equation by adding nonlinear terms designed to cause collapse.
8. Do not steal from classical physics by insisting that particle position or field configuration variables must evolve deterministically.
9. Do not testify as a false witness to the existence of histories of events that do not appear in the empirical records.
10. Do not be envious of your neighbor’s state  $\sigma$ . Do not be envious of your neighbor’s dynamical CP-map  $\mathcal{F}$ , his POVM elements  $\{N_j\}$ , his update CP-maps  $\mathcal{F}_j$ , his Kraus operators  $F_{jk}$ , his donkey, or anything else that is your neighbor’s, for they only describe his beliefs (except for the donkey), which naturally differ from yours.