LIMITS IN DAGGER CATEGORIES

CHRIS HEUNEN AND MARTTI KARVONEN

A dagger category is a category equipped with a dagger: a contravariant involutive identity-on-objects endofunctor. Such categories are used to model quantum computing and reversible computing, amongst others. The philosophy when working with dagger categories is that all structure in sight should cooperate with the dagger. This causes dagger category theory to differ in many ways from ordinary category theory. Standard theorems have dagger analogues once one figures out what "cooperation with the dagger" means for each concept, but often this is not just an application of formal 2-categorical machinery or a passage to (co)free dagger categories.

We discuss limits in dagger categories. To cooperate with the dagger, limits in dagger categories should be defined up to a unique unitary isomorphism (instead of only up to iso), that is, an isomorphism whose inverse is its dagger. We exhibit a definition that achieves this and generalises known cases of dagger limits. Moreover, we discuss connections to polar decomposition, applications to ordinary category theory and time permitting, address commutativity of dagger limits with dagger colimits.