LAX GRAY TENSOR PRODUCT FOR 2-QUASI-CATEGORIES

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The *Gray tensor product* [2, §4] plays a crucial role in classical 2-category theory. It is a "weaker" or "less commutative" kind of product, and there are two versions (up to duality) depending on whether one wants the comparison 2-cell between $(f \otimes 1)(1 \otimes g)$ and $(1 \otimes g)(f \otimes 1)$ to be invertible or not; the former is the *pseudo* version while the latter is called *lax*.

Our ultimate goal is to "do 2-category theory" in 2-quasi-categories which are a model of $(\infty, 2)$-categories introduced by Ara in [1]. In particular, it requires extending the definition of Gray tensor product to the 2-quasi-categorical context. Luckily, their geometric nature means the usual categorical product of 2-quasi-categories models the pseudo Gray tensor product. However, constructing the lax Gray tensor product and proving it is "homotopically well-behaved" (*i.e.* left Quillen) is a non-trivial task, and this is what we will present in this talk.

References

[1] Dimitri Ara. Higher quasi-categories vs higher rezk spaces. *Journal of K-Theory. K-Theory and its Applications in Algebra, Geometry, Analysis & Topology*, 14(3):701, 2014.

[2] John W. Gray. *Formal category theory: adjointness for 2-categories*. Lecture Notes in Mathematics, Vol. 391. Springer-Verlag, Berlin-New York, 1974.