MICHAEL LIEBERMAN, JIŘÍ ROSICKÝ, SEBASTIEN VASEY, Weak factorization systems and stable independence.
Department of Mathematics and Statistics, Masaryk University, Kotlářská 2, 602 00 Brno, Czech Republic.
E-mail: lieberman@math.muni.cz.

We discuss recent joint work with Rosický and Vasey, [1], which reveals surprising connections between model-theoretic independence notions and the behavior of weak factorization systems, which play an important role in the analysis of model categories and in homological algebra. In essence, given a reasonable category $\mathcal{K}$ and family of maps $\mathcal{M}$, the category $\mathcal{K}_\mathcal{M}$ obtained by restricting to the morphisms in $\mathcal{M}$ has a stable independence notion just in case $\mathcal{M}$ forms the left half of a cofibrantly generated weak factorization system, i.e. one generated by pushouts and transfinite compositions from a set—rather than a class—of basic maps. We sketch the argument, recalling the category-theoretic generalization of stable nonforking independence from [1], as well as the necessary terminology involving weak factorization systems.

As a particular example, we specialize to the case $\mathcal{K} = R$-$\text{Mod}$ and $\mathcal{M}$ a class of homomorphisms with kernels in a fixed subcategory: this generalizes the (abstract elementary) classes of modules $^+N$ considered by Baldwin-Eklof-Trlifaj, [3], and answers a number of questions from their paper. In particular, we prove that this class is tame and stable whenever it is an AEC.

