GROTHENDIECK HEARTS OF T-STRUCTURES VIA UNIVERSAL CONSTRUCTIONS

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(based on ongoing joint work with Jan Stovicek)

We will show some universal constructions associated to (co)homological functors on well-behaved triangulated categories with coproducts. We will then show how these constructions help to tackle the problem of when the heart of a t-structure in any such category has a heart which is a Grothendieck category. In particular, this will lead to the development of a purity theory in standard well-generated triangulated categories, i.e. triangulated categories obtained as Verdier quotients of compactly generated ones by localizing subcategories generated by sets of objects.

As a consequence, we will show that if $\mathbf{t} = (\mathcal{U}, \mathcal{V})$ is a t-structure in any of such triangulated categories satisfying that the co-aisle $\mathcal{V}$ is closed under pure epimorphisms and pure-injective envelopes, then the heart $\mathcal{H}_{\mathbf{t}}$ is a Grothendieck category. This includes the case of a compactly generated t-structure (in any ambient triangulated category with coproducts), in which case we can even prove that $\mathcal{H}_{\mathbf{t}}$ is locally finitely presented.