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*The equivalence of ordered groupoids and left cancellative categories using double categories*

Lawson gave a correspondence between left cancellative categories and ordered groupoids (groupoids equipped with a partial order on its arrows and that have a notion of restricting/corestricting to a smaller domain/codomain). Lawson and Steinberg then introduce Ehresmann topologies and give a correspondence between Ehresmann topologies on ordered groupoids and Grothendieck topologies on left cancellative categories, and prove that any etendue is equivalent to the category of sheaves on some Ehresmann site (an ordered groupoid equipped with an Ehresmann topology).

By considering ordered groupoids as double categories, we are able to extend Lawson's correspondence to an adjoint equivalence of 2-categories between the 2-category of left cancellative categories and the 2-category of ordered groupoids. Making use of this equivalence, we can then state a comparison lemma for Ehresmann sites, which classifies functors between Ehresmann sites that induce an equivalence between their categories of sheaves.

This is joint work with Dorette Pronk.