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**Resource reflecting functor and its application to non-uniformity<sup>1</sup>**

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Univ of Calgary — In this work, we formulate an abstract approach to translate one resource theory to another. We adopt the notion of resource theories as partitioned symmetric monoidal categories and extend this notion by considering resource-reflecting functors between resource theories. A functor  $F$  is a structure preserving map and  $F$  is said to be resource-reflecting if  $F(g)$  being a free transformation implies that the transformation  $g$  is also free. Thus, a resource-reflecting functor demonstrates that the existence of a free transformation between two resources in the domain resource theory can be inferred from the existence of a free transformation in the codomain theory. As an example, we construct one such functor from the resource theory of non-uniformity to a resource theory of majorization. Thus, our work lays a foundation for expressing similarities between resource theories and for applying results achieved in one resource theory to another. An abstract approach to the translation between theories enables common patterns to be identified between resource theories thereby reducing the effort of solving the same problem for different theories.

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