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A Recognition Principle for Diagram Categories

When is an enriched model category M Quillen equivalent to a category of enriched presheaves with the projective model structure? In joint work with Boris Chorny, we show that this occurs if and only if M has a set of "homotopy atoms," i.e., objects whose derived mapping functors jointly detect weak equivalences and preserve certain weighted homotopy colimits. Our result extends Marta Bunge's recognition theorem and generalizes the orbits of Dwyer and Kan. As an application to functor calculus, I will explain how reduced n-excisive functors from finite pointed simplicial sets to spectra can be modeled by a diagram category.