# On a characterization of vector bundles

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## Abstract

We are concerned with smooth actions of the multiplicative monoid of the real numbers. Examples of such actions are given by the homotheties on a vector bundle, and moreover, any action satisfying a regularity condition arises in this way, leading to a characterization of vector bundles over manifolds. In a joint work with H. Bursztyn (IMPA) and A. Cabrera (UFRJ) we adapt this idea to describe vector bundles over Lie groupoids and Lie algebroids, and their behavior under differentiation and integration. These objects have received much attention lately because of their deep ties with Poisson geometry and with representations up to homotopy. The plan of this talk is to describe the characterization of vector bundles as actions, to outline its application to the realm of groupoids and algebroids, and if time permits, to discuss the non-regular case, on which other interesting geometric structures arise naturally.