

# Oriented matroid theory as a mathematical framework for *M*-theory

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## Abstract

We claim that *M*(atroid) theory may provide a mathematical framework for an underlying description of *M*-theory. Duality is the key symmetry which motivates our proposal. The definition of an oriented matroid in terms of the Farkas property plays a central role in our formalism. We outline how this definition may be carried over *M*-theory. As a consequence of our analysis, we find a new type of action for extended systems which combines dually the  $p$ -brane and its dual  $p^\perp$ -brane.

In the references [1–5] were established a number of connections between oriented matroid theory [6] and several ingredients of *M*-theory [7–9] including  $D = 11$  supergravity, Chern–Simons theory, string theory and  $p$ -brane physics. The real motivation for such connections has been to implement a kind of “duality principle” in *M*-theory via oriented matroid theory. As it is