

# Topological T-duality and T-folds

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## Abstract

We explicitly construct the  $C^*$ -algebras arising in the formalism of Topological T-duality due to Mathai and Rosenberg from string-theoretic data in several key examples. We construct a continuous-trace algebra with an action of  $\mathbb{R}^d$  unique up to exterior equivalence from the data of a smooth  $\mathbb{T}^d$ -equivariant gerbe on a trivial bundle  $X = W \times \mathbb{T}^d$ . We argue that the “non-commutative T-duals” of Mathai and Rosenberg [7] should be identified with the non-geometric backgrounds well known in string theory. We also argue that the  $C^*$ -algebra  $\mathcal{A} \rtimes_{\alpha|_{\mathbb{Z}^d}} \mathbb{Z}^d$  should be identified with the T-folds of Hull [1] and Belov *et al.* [2] which geometrize these backgrounds.

We identify the charge group of D-branes on T-fold backgrounds in the  $C^*$ -algebraic formalism of Topological T-duality. We also study D-branes on T-fold backgrounds. We show that the  $K$ -theory bundles of [13] give a natural description of these objects.