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Gerbes, principal 2-group bundles and characteristic classes

It is well known that a principal G -bundle P over a manifold M determines a homotopy class of maps f from M to the classifying space BG of the group G . Pulling back the generators of $H^*(BG)$ through f , one obtains characteristic classes of the principal bundle P over M . It is a classical theorem that these characteristic classes coincide with those obtained from the Chern–Weil construction using connections and curvatures.

Gerbes are higher analogue of principal bundles. We will discuss an analogue of Chern's theorem for Gerbes. The idea is to relate Gerbes with 2-group principal bundles, and to study characteristic classes of these principal 2-group bundles.