

1106-53-330

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Formality in Cosymplectic and Sasakian Geometries.

One of the results of Deligne, Griffiths, Morgan and Sullivan states that any compact Kähler manifold is formal. The importance of formality in symplectic geometry stems from the fact that it allows to distinguish compact symplectic manifolds which admit Kähler metrics from those which do not.

In this talk, we study the formality for the odd-dimensional counterpart to Kähler and symplectic manifolds, namely for cokähler, Sasakian and cosymplectic manifolds. Compact cokähler manifolds are formal. For simply connected Sasakian manifolds we prove that all higher Massey products vanish. Nevertheless, we present examples of simply connected compact Sasakian manifolds of dimension $2n + 1 \geq 7$ which are non-formal because they have a non-zero triple Massey product. On the other hand, we give conditions under which a mapping torus has a non-zero triple Massey product. We apply this to prove that there are compact cosymplectic manifolds of dimension $2n + 1 \geq 3$ and with first Betti number $b \geq 1$ which are non-formal excepting for $(2n + 1, b) = (3, 1)$. (Any compact manifold of dimension 3 and with first Betti number $b = 1$ is formal but not necessarily cokähler.) (Received September 13, 2014)