COHOMOLOGIES ON SYMPLECTIC MANIFOLDS

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In 1988 Brylinski [1] conjectured, by analogy with the Hodge theory, that any de Rham cohomology class admits a symplectically harmonic representative. This conjecture holds if and only if the manifold satisfies the Hard Lefschetz Condition [2], and therefore the number of de Rham classes admitting harmonic representative can vary if we consider different symplectic structures. When this occurs, the manifold is said *flexible*.

Recently, Tseng and Yau have introduced other cohomologies on symplectic manifolds that admit unique harmonic representative within each class and showed that there exist primitive cohomologies associated with them such that their dimensions can vary with the class of the symplectic form, giving rise another notion of flexibility, [3, 4].

In the present talk we relate both situations and we will give conditions in low dimensions to ensure that both flexibilities are equivalent.

References

[1] J.-L. Brylinski, *A differential complex for Poisson manifolds*, J. Differential Geom. **28** (1988), 93-114.

[2] O. Mathieu, *Harmonic cohomology classes of symplectic manifolds*, Comment. Math. Helv. **70** (1995), 1–9.

[3] L.-S. Tseng, S.-T. Yau, *Cohomology and Hodge theory on symplectic manifolds: I*, J. Differential Geom. **91** (2012) 383–416.

[4] L.-S. Tseng, S.-T. Yau, *Cohomology and Hodge theory on symplectic manifolds: II*, J. Differential Geom. **91** (2012) 417–444.