

Objectives

List of specific objectives:

1. Determination of existence (or non-existence) of LCK metrics on the blow-up of an LCK manifold along a submanifold (or, more generally, along a closed analytic subspace).
2. Study of holomorphic bundles over LCK manifolds. In particular, we would like to determine which elliptic principal bundles over a Kähler base admit LCK metrics. This could lead to some new examples (or counter-examples) of manifolds of LCK type.
Continuation of the study of Oeljeklaus-Toma manifolds (even of those for which it is unknown so far whether they are of LCK type or not); more, it would be desirable to obtain (also in conjunction with the previous objective) new results in the study of holomorphic vector bundles over this type of manifolds.
4. A compared study of LCK and LCS (*Locally conformally symplectic*) manifolds, as well as toric LCK manifolds. It would be desirable to obtain a characterisation of toric LCK manifolds; more, the Vaisman manifolds should be somehow correlated to toric Sasakian manifolds via some structure theorem, but unfortunately such a theorem is still missing. Henceforth, probably the first step would be to obtain a characterisation of toric Vaisman manifolds, a further step (yet likely very difficult) being a Delzant-type result.
5. Using a technique already used in the study of Vaisman formal manifolds, we can hope to extend these results to other type of structures (e.g. cosymplectic structures). this would represent a contribution to the understanding of differences between topological and respectively geometrical formality on Riemannian manifolds.
6. The continuation of the study of harmonic maps and harmonic morphisms between LCK manifolds, and also some possible extensions of the Yang-Mills conditions.
7. The study of LCK geometry in indefinite context is still at its very beginning. We intent to continue this research direction, especially in the paraquaternionic context.

Workplan

Year		Objectives
2011	1	Elliptic bundles vs LCK metrics (L. Ornea, V. Vuletescu)
2012	1	Blow-up's of LCK manifolds (L. Ornea)
2012	2	Holomorphic bundles over LCK manifolds (L. Ornea, V. Vuletescu)
2013	1	Generalized Yang-Mills functionals in LCK geometry and related structures (C. Gherghe)
2013	2	Indefinite LCK geometry and possible extensions (L. Ornea, G. Vîlcu).
2014	1	Olejeklaus-Toma manifolds (L. Ornea, V. Vuletescu)
2014	2	Toric Vaisman manifolds (L. Ornea)
2014	3	Harmonic maps in LCK geometry and related structures (C. Gherghe)