

ATELIER SUR LES EDP GÉOMÉTRIQUES
23-27 AVRIL, 2012

WORKSHOP ON GEOMETRIC PDE
APRIL 23-27, 2012

Extremal Kähler metrics on toric orbifolds with $b_2(M) = 2$

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I will discuss an explicit resolution of the existence problem for extremal Kähler metrics on toric 4-orbifolds M with second Betti number equal to 2. More precisely, I will show that M admits such a metric if and only if its rational Delzant polytope (which is a labelled quadrilateral) is K-polystable in the relative, toric sense (as studied by S. Donaldson, E. Legendre, G. Székelyhidi *et al.*). Furthermore, in this case, the extremal Kähler metric is ambitoric, i.e., compatible with a conformally equivalent, oppositely oriented toric Kähler metric, which turns out also to be extremal. Among the explicit extremal Kähler metrics obtained, there are Bach-flat (i.e. conformally Einstein) examples which are Riemannian analogues of the exact solutions of the Einstein equations in General Relativity, found by R. Debever, N. Kamran, and R. McLenaghan.

This is a joint work with D. Calderbank and P. Gauduchon.

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