

Lagrangian fibrations in dimension four

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Compact hyperkähler occupy a central place in modern algebraic and complex geometry. They are close relatives of complex tori and Calabi-Yau varieties. In many respect their geometric features are closer to the former and a direct link is established via Lagrangian fibrations of hyperkähler manifolds which cover the hyperkähler manifold by tori.

The basis of the fibration (in the compact case) is conjectured to always be one of the simplest geometries, namely a projective space. In fact the conjecture as been proved by J.-M. Hwang for the case that the base is known to be smooth. However, even in dimension four and despite work of Wenhao Ou, the smoothness was not known. In recent work with Chenyang Xu (and independently by Bogomolov-Kurnosov) we conclude the proof of the conjecture in dimension four by excluding the most exotic possible, the E_8 singularity.