

Austere Submanifolds in Complex Projective Space

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Abstract:

A submanifold M in Euclidean space \mathbb{R}^n is austere if all odd-degree symmetric polynomials in the eigenvalues of the second fundamental form (in any normal direction) vanish. Harvey and Lawson showed that this condition is necessary and sufficient for the normal bundle of M to be special Lagrangian in the tangent bundle of \mathbb{R}^n . A similar result was proved by Karigiannis and Min-Oo for submanifolds in the n -sphere, with the tangent bundle of the sphere carrying a Ricci-flat metric due to Stenzel. In this joint work with Thomas Ivey, we determine conditions under which the normal bundle of a CR-submanifold in complex projective space is special Lagrangian with respect to the Stenzel metric on the tangent bundle of the projective space. In particular, we prove that the normal bundle of a holomorphic submanifolds in $\mathbb{C}P^n$ is always special Lagrangian in $T\mathbb{C}P^n$, endowed with this Stenzel metric. We give examples in the case of hypersurfaces in $\mathbb{C}P^2$, and some nonexistence results in the totally real case.