5-dimensional Heisenberg holonomy from special generic 2-plane fields on 5-manifolds

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Abstract:

Leistner and Nurowski identified generic 2-plane fields on 5-manifolds as a source of metrics of holonomy equal to the split real form of G_2 by exploiting Nurowski's conformal construction and the Fefferman-Graham ambient metric. By applying their construction to a family of highly symmetric plane fields defined by a special Monge normal form (and employing a little knowledge of the algebra of the split octonions) we exhibit an explicit, infinite-dimensional family of 7-dimensional metrics with holonomy equal to the 5-dimensional Heisenberg group. This group acts reducibly but indecomposably, situating it in the difficult and infrequently evidenced territory of metric holonomy groups outside the scope of the celebrated Berger list.