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Riemannian curvature measures

A famous theorem of Weyl states that if M is a compact submanifold of euclidean space, then the volumes of small tubes about M are given by a polynomial in the radius r, with coefficients that are expressible as integrals of certain scalar invariants of the curvature tensor of M with respect to the induced metric. It is natural to interpret this phenomenon in terms of valuations and curvature measures canonically associated to the Riemannian structure of M. The resulting apparatus takes the form of a certain abstract module over the polynomial algebra $\mathbb{R}[t]$ that reflects the behavior of Alesker multiplication. Applying it to isotropic M, this module encodes a key piece of the array of its associated kinematic formulas. We illustrate this principle in precise terms in the case where M is a complex space form. This is joint work with Thomas Wannerer.