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Richard Montgomery* (rmont@math.ucsc.edu), Math, UCSC, Santa Cruz, CA 95064. *G₂ and Rolling.*

The act of rolling a sphere of radius A on a sphere of radius B defines a nonintegrable rank 2 distribution (subbundle of the tangent bundle) of a certain 5-manifold. For most ratios of A to B the symmetry of this distribution is the obvious one: the product of the rotation groups for the two spheres. But for a ratio of 1 to 3 the symmetry is the split form of the exceptional group G₂. This fact was known to E. Cartan by 1910 and is well-known to R. Bryant and his students, and also in Japan to Tanaka and his students. But to many differential geometers this fact comes as a big surprise. We will describe what we know of this fact and, time permitting, how Tanaka's methods play out for quaternionic-contact distributions. (Received February 23, 2006)