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Riemannian Geometry Framed as a Generalized Lie Algebra to Incorporate General Relativity with Quantum Theory JOSEPH JOHNSON[1], Univ of South Carolina — This paper reframes Riemannian geometry (RG) as a generalized Lie algebra allowing the equations of both RG and general relativity (GR) to be expressed as commutation relations among fundamental operators along with relativistic quantum theory (RQT) and the standard model (SM). Beginning with an Abelian Lie algebra of n operators X, whose simultaneous eigenvalues, y, define a real n-dimensional space R(n), we then define n additional operators, D whose exponential map is to translate the X operators resulting in a noncommutative algebra of operators (observables) where the "structure constants" are shown to be the metric functions of the X operators thus allowing for spatial curvature. The D operators then have a Hilbert space position-diagonal representation as generalized differential operators which with the metric, written as a commutator, can express the Christoffel symbols the Riemann, Ricci, and other tensors as commutators in this representation. Traditional RG and GR are expressed in this generalized Lie algebra providing a more general framework for RG to support an integration among GR, RQT, and the SM by generalizing Lie algebras as described. Non-trivial consequences are discussed.

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