On the physical meaning of the spin projection operator

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Spin is a fundamental property of the electron, and yet its physical essence remains nearly as enigmatic as it was a century ago. The successful use of the abstract matrix formalism in terms of Pauli matrices has somehow served to set aside the task of understanding its meaning. Dirac's relativistic generalization adds little to this situation. With the purpose of contributing to a local, realist description of the quantum phenomenon associated with spin, in this work we set out to delve into the physical meaning of the spin projection operator. The image obtained—on the basis of a careful reading of the quantum expressions—leads to relevant conclusions about the assumptions normally made in connection with the spìn correlation for the entangled bipartite singlet spin state, which severely restrict the range of applicability of the CHSH inequality.