Abstract: Magnetic exchange interactions (MEIs) define networks of coupled magnetic moments and lead to a surprisingly rich variety of their magnetic properties. Typically MEIs can be estimated by fitting experimental results. But how many MEIs need to be included in the fitting process for a material is not clear a priori, which limits the quality of results obtained by these conventional methods. In this paper, based on linear spin-wave theory but without performing matrix diagonalization, we show that for a general quadratic spin Hamiltonian, there is a simple relation between the Fourier transform of MEIs and the sum of square of magnon energies (SSME). We further show that according to the real-space distance range within which MEIs are considered relevant, one can obtain the corresponding relationships between SSME in momentum space. We also develop a theoretical tool for tabulating the rule about SSME. By directly utilizing these characteristics and the experimental magnon energies at only a few high-symmetry k points in the Brillouin zone, one can obtain strong constraints about the range of exchange path beyond which MEIs can be safely neglected. Our methodology is also general applicable for other Hamiltonian with quadratic Fermi or Boson operators. Focus on 3d systems, we also demonstrate that the interplay between crystal symmetry and electron correlation can dramatically enhance the SOC effect in certain partial occupied orbital multiplets, through the self-consistently reinforced orbital polarization as a pivot. We then provide design principles and comprehensive databases, in which we list all the Wyckoff positions and site symmetries, in all two-dimensional (2D) and three-dimensional (3D) crystals that potentially have such enhanced SOC effect.