Lie algebraic invariant meaning of the non-degeneracy conditions in the Kolmogorov - Arnold - Moser (KAM) theory

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It is proved that the Kolmogorov - Poincare non-degeneracy condition for an integrable Hamiltonian system is equivalent to the condition that its Lie algebra of symmetries is abelian. The iso-energetic non-degeneracy condition is equivalent to the condition that the Lie algebra of iso-energetic conformal symmetries is abelian.