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No dominance of RKKY interaction in 4f-magnets GERMAN SAMOLYUK, VLADIMIR ANTROPOV, Ames Laboratory — It is a common belief that in the rare earth materials the dominating exchange mechanism is the magnetic coupling between localized 4f-moments mediated by nearly free conduction electrons resulting in so-called indirect coupling or RKKY interaction. In addition, several experimental proofs have been published in the past. We reanalyzed the validity of this statement from a point of view of realistic atomic and solid state electronic structure. The experimental proofs have been reanalyzed as well. In general, we found that no theoretical validation of RKKY dominance in 4f-magnets exist and all experimental evidences cannot rule out other mechanisms. We claim that the direct interatomic exchange between conduction electrons must be always taken into account.

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