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Overfrustrated and Underfrustrated Spin-Glasses in d=3 and d=2: Evolution of Phase Diagrams and Chaos Including Spin-Glass Order in d=2 EFE ILKER, Sabanci University, A. NIHAT BERKER, Sabanci University and MIT — In spin-glass (SG) systems, frustration can be adjusted continuously and considerably, without changing the antiferromagnetic (AF) bond probability p, by using locally correlated quenched randomness, both on hypercubic and hierarchical lattices [1]. With removal of 51% frustration, a SG phase occurs in d=2. With addition of 33% frustration, the SG phase disappears in d=3. In general, frustration lowers the SG ordering temperature. At low temperatures, increased frustration favors the spin-glass phase (before it disappears) over ferromagnetic (F) and AF phases. When any amount of frustration is introduced, chaotic rescaling of local interactions occurs in the SG phase. Chaos increases with increasing frustration. The distinct Lyapunov exponents of all chaotic phases and phase boundaries are calculated. From entropy and specific-heat curves in d = 3, it is seen that frustration lowers in temperature the onsets of long- and short-range orders in spin-glass phases, more effectively on the former. From entropy versus p, it is seen that ground-state and low-temperature entropy already mostly sets in within the F and AF phases, before the SG phase is reached.

[1] E. Ilker, A.N. Berker, Phys. Rev. E 89 042139 (2014).

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