Dual time scales in simulated annealing of a two-dimensional Ising Spin Glass[1] NA XU, SHANON RUBIN, ANDERS SANDVIK, Department of Physics, Boston University — We apply simulated annealing to a 2D Ising spin glass (2DISG) with bimodal random couplings and analyze results for different system sizes and velocities based on a generalized Kibble-Zurek (KZ) scaling ansatz [1]. As the system approaches T=0, the critical temperature, we find two different time scales (dynamic exponents) governing the relaxation of the spin-glass order parameter and the excess energy. The energy relaxes slower than the order parameter. We argue that this unusual behavior is in accord with the entropy-enhanced ordering mechanism based on the droplet theory in 2DISG [2]. We discuss the relevance of our findings to optimization theory. [1] Shanon J. Rubin, Na Xu, Anders W. Sandvik, arXiv:1609. 09024. [2] C. K. Thomas, D. A. Huse, and A. A. Middleton, Phys.Rev. Lett. 107, 047203 (2011).

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