

Abstract Submitted  
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**Patch planting of hard spin-glass problems: Getting ready for the next generation of optimization approaches**<sup>1</sup> WENLONG WANG, Department of Physics and Astronomy, Texas AM University, SALVATORE MANDRÀ, NASA Ames Research Center Quantum Artificial Intelligence Laboratory (QuAIL) Stinger Ghaffarian Technologies Inc., HELMUT KATZGRABER, Department of Physics and Astronomy, Texas AM University — We propose a patch planting heuristic that allows us to create arbitrarily-large Ising spin-glass instances on any topology and with any type of disorder, and where the exact ground-state energy of the problem is known by construction. By breaking up the problem into patches that can be treated either with exact or heuristic solvers, we can reconstruct the optimum of the original, considerably larger, problem. The scaling of the computational complexity of these instances with various patch numbers and sizes is investigated and compared with random instances using population annealing Monte Carlo and quantum annealing on the D-Wave 2X quantum annealer. The method can be useful for benchmarking of novel computing technologies and algorithms.

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Wenlong Wang  
Department of Physics and Astronomy, Texas A  
M University

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