Ramsey numbers and adiabatic quantum computing FRANK GAI-
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sity — The graph-theoretic Ramsey numbers are notoriously difficult to calculate.
In fact, only nine Ramsey numbers are currently known, with knowledge of other
Ramsey numbers limited to bounds on their possible value. We describe a quan-
tum algorithm for the computation of Ramsey numbers. We show how the problem
of computing a Ramsey number can be mapped to a combinatorial optimization
problem whose solution can be found using adiabatic quantum evolution (AQE).
We numerically simulate this adiabatic quantum algorithm and show that it cor-
rectly determines the Ramsey numbers R(3,3) and R(2,s) for s ≤ 6. We also discuss
experimental implementation of an adiabatic quantum computation of R(3,3).

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