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BCS-BEC Crossover: Critical Temperature Curve and Thermodynamics EVGENY KOZIK, BARBARA CAPOGROSSO-SANSONE, NIKOLAY PROKOF'EV, BORIS SVISTUNOV, University of Massachusetts — The strongly-correlated regime of the BCS-BEC crossover can be realized by diluting a system of two-component fermions with a contact attractive interaction and an appropriate ultraviolet regularization. We investigate this system via a novel systematic-error-free continuous-space-time diagrammatic determinant Monte Carlo method. The results allow us to predict the universal curve T_c/ε_F as a function of the parameter $k_F a$ with the maximum on the BEC side. At unitarity, $T_c/\varepsilon_F = 0.152(7)$. We also determine the thermodynamic functions and show how the Monte Carlo results can be used for accurate thermometry.

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