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Pico: Parameters for the Impatient Cosmologist WILLIAM FENDT, University of Illinois at Urbana-Champaign, BENJAMIN WANDEL, University of Illinois at Urbana-Champaign — We present a fast, accurate and robust method of accelerating cosmological parameter estimation. The algorithm, called Pico, can compute the CMB power spectrum, matter transfer function and WMAP likelihood in about 20 milliseconds. This is approximately 1500 times faster than CAMB at default accuracies and 250,000 times faster at high accuracy. For the 9 parameter nonflat case presented here Pico can on average compute the TT, TE and EE spectra to better than 1% of cosmic standard deviation for nearly all ℓ values over a large region of parameter space. By removing the major bottlenecks in parameter estimation codes, Pico decreases the computational time required to explore the parameter posterior by 1 or 2 orders of magnitude. Performing a cosmological parameter analysis of current CMB and large scale structure data, we show that these power spectra give very accurate 1 and 2 dimensional parameter posteriors. Training Pico can be done using massively parallel computing resources, including distributed computing projects such as Cosmology@Home.

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