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Constraints on Cosmic-Ray Propagation Models from a Global Bayesian Analysis[1] IGOR MOSKALENKO, Stanford University, ROBERTO TROTTA, Imperial College London, GUDLAUGUR JÓHANNESSON, University of Iceland, TROY PORTER, Stanford University, ROBERTO RUIZ DE AUSTRI, Instituto de Fisica Corpuscular, ANDREW STRONG, MPE — Research in many areas of modern physics such as, e.g., indirect searches for dark matter and particle acceleration in SNRs rely on studies of cosmic rays (CRs) and associated diffuse emissions (radio to gamma rays). While very detailed numerical models of CR propagation exist, a quantitative statistical analysis of such models has been so far hampered by the large computational effort that those models require. We are presenting a working method for a full Bayesian parameter estimation for a numerical CR propagation model GALPROP, the most advanced of its kind to self-consistently predict CRs, gamma rays, synchrotron, and other observables. We demonstrate that a full Bayesian analysis is possible using nested sampling and Markov Chain Monte Carlo methods (implemented in the SuperBayeS code) despite the heavy computational demands. The best-fit values of parameters are in agreement with previous studies also based on GALPROP.

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