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An MCMC approach to measuring the explosion properties of young Supernova Remnants[1] PRASIDDHA ARUNACHALAM, JOHN P HUGHES, Rutgers- The State University of New Jersey, LUKE HOVEY, Los Alamos National Laboratory — Supernova remnants (SNRs) result from the interaction of the debris of supernova explosions with the surrounding interstellar medium (ISM). They emit across the entire electromagnetic spectrum and offer a unique way to study explosions and their effects on the ISM. Theoretical models for SNRs involve detailed, often messy ionization and temperature calculations to predict the expected emission from different charged species. These are then compared with observations of SNRs to infer the properties of the parent explosion. Here, we present an alternative approach that only uses the fluid-discontinuities to measure the explosion properties of a SNR's originating explosion. By fluid-discontinuities, we refer to the outward propagating forward-shock (FS) or blast wave propagating into the ISM, and the reverse-shock (RS) traveling back into the ejecta. We set up a Markov Chain Monte Carlo formalism to compare observed properties of SNRs such as the FS/RS radius and velocity with similarity solutions of young SNRs expanding in a uniform ambient medium. We apply this method on SNR 0509-67.5 to constrain its age, explosion center, energy, and the density of the ambient medium surrounding the remnant.

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