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Computer Simulations of the Early Universe

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We are now able to simulate much of the early universe from the time of the Electro-Weak Phase Transition through the end of primordial nucleosynthesis. This simulation is performed using a General Relativistic Magnetohydrodynamic code based on the Cactus framework. It solves both the relativistic magnetohydrody-namic equations and Einstein's equations of General Relativity. As a result, it can simulate: magnetogenesis, primordial gravitational waves, turbulence, primordial perturbations and the role of dark matter in the early universe. Future work will involve extrapolating this work to the present epoch.

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