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**The Universe as an Accelerator: The Primordial Lithium Problem and Dark Matter**

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The sciences of outer space and inner space – cosmology and nuclear/particle physics – are converging. The early universe is a central arena for this interplay, and big-bang nucleosynthesis is particularly important because it represents our earliest reliable cosmic probe. We will summarize the current status of nucleosynthesis and the transformative influence of the WMAP determination of the cosmic baryon density. WMAP and nucleosynthesis theory make tight predictions for the primordial abundances of the lightest nuclides: deuterium observations agree spectacularly with these predictions, but lithium observations are significantly discrepant–this is the "lithium problem." Moreover, the cosmic baryon density is now well-determined by nucleosynthesis and WMAP, and implies that the bulk of cosmick matter must take an exotic "non-baryonic" form. The existence of non-baryonic dark matter immediately demands particles and possibly interactions beyond the Standard Model of elementary particle physics. We will discuss ongoing and future searches for particle dark matter. Finally, we will discuss the possibility that Supersymmetry can lead to dark matter interactions which can affect nucleosynthesis and possibly solve the lithium problem.