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Bayesian Hierarchical Models for parameter inference with missing data: Supernova cosmology case study.

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Large scale astronomical surveys are going wider and deeper than ever before. However, astronomers, cosmologists and theorists continue to face the perennial issue that their data sets are often incomplete in magnitude space and must be carefully treated in order to avoid Malmquist bias, especially in the field of supernova cosmology. Historically, cosmological parameter inference in supernova cosmology was done using χ^2 methodology; however, recent years have seen a rise in the use of Bayesian Hierarchical Models. In this paper we develop a Bayesian Hierarchical methodology to account for magnitude limited surveys and present a specific application to cosmological parameter inference and model selection in supernova cosmology.

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