

**Topic:** Quantitative analysis in astronomy using Bayesian Inference and Markov Chain Monte Carlo (MCMC) methods.

1. Background on the importance of statistical inference in observational astronomy; modern challenges in terms of data rates and model complexity.
2. Description of Bayesian and MCMC methods.
3. Choose several representative examples of Bayesian or MCMC estimation in observational astronomy; discuss the scientific importance and technical challenges of each example.
4. General conclusions regarding these quantitative analysis methods in the future of observational astronomy.

**Rough Outline:**

1. Introduction
2. Methodology
3. Case Studies
  - (a) Example
    - i. Problem overview
    - ii. Implementation of analysis
    - iii. Pros/Cons of Implementation
    - iv. Future work
  - (b) Another example x5
4. Discussion