PyAutoFit: Automated Bayesian Inference

James Nightingale
Richard Hayes
Non-linear Bayesian Inference

• Numerous mature techniques for sampling non-linear parameters spaces:
  - MCMC, nested sampling, generic algorithms, etc.

• Major challenge adopting these methods to highly complex parameter spaces.

• Major challenge analysing extremely large datasets in a fully automated fashion.
- Break model fitting down into a set of self-contained non-linear searches, or ‘phases’.
• Break model fitting down into a set of self-contained phases.

• Reduced scope: ensures best-fit solution is found.

• Pass Information: More complex later phases uses results of earlier phases to navigate parameter space successfully.
PyAutoFit

• Software library that allows Bayesian model fitting pipelines to be built in a general way.
  - Link together different non-linear optimizers.
  - Advanced statistical inference techniques (hierarchical models, transdimensional fitting).
  - Handles model setup, configs, visualization, etc.
Use-case: PyAutoLens
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• Checkout our poster 9.6!

• Traditional analysis would fit the lens’s light, mass and source simultaneously.

• With PyAutoFit, we break this fit down into 3 phases.
Phase 1 – Lens’s Light

Fit Image

Fit Model Image
Phase 1 – Lens’s Light
Phase 2 – The Source
Phase 2 – The Source
Phase 3 – Fit Both!
Phase 3 – Fit Both!
PyAutoFit

• Poster 3.7:  
  Opposite bar where coffee is served

• Github:
  https://github.com/rhayes777/PyAutoFit