PyAutoFit: Automated Bayesian Inference

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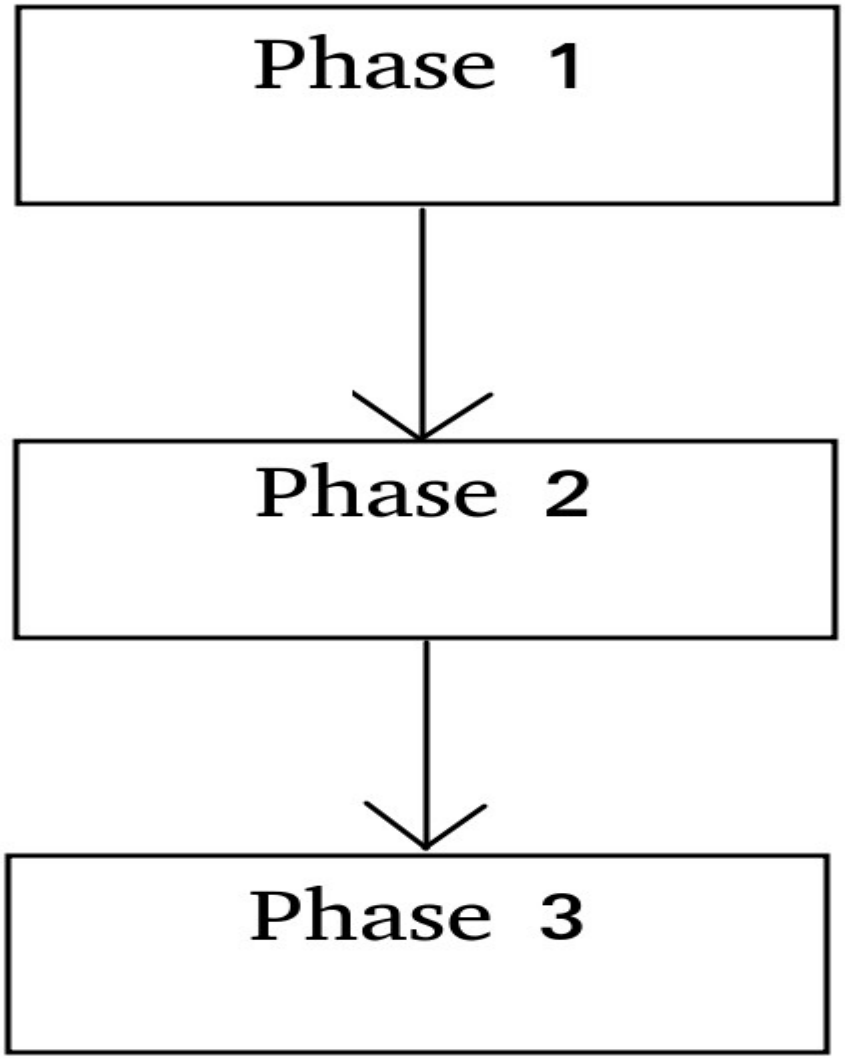
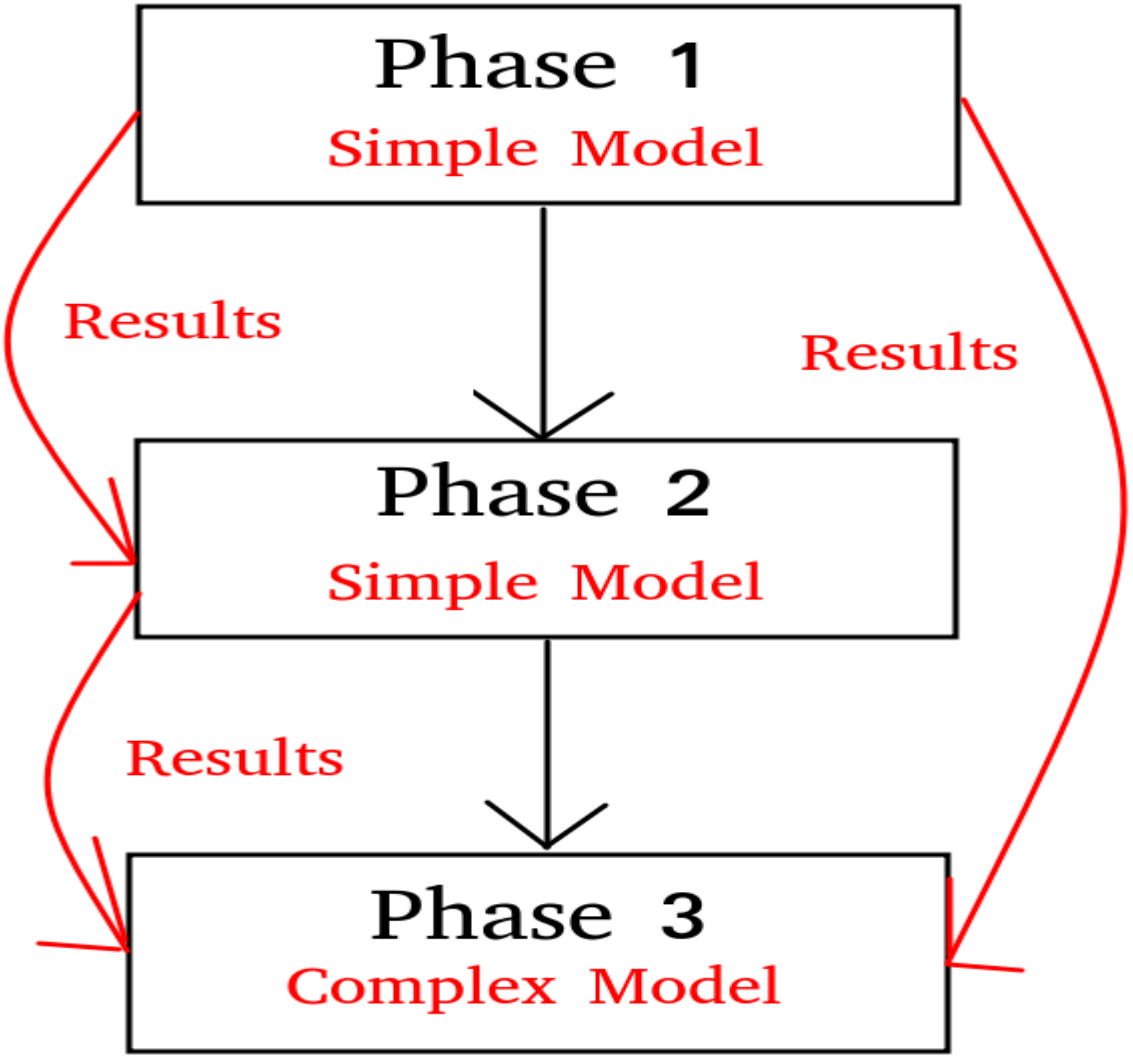
Non-linear Bayesian Inference

- **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 analsying extremely large data-sets 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

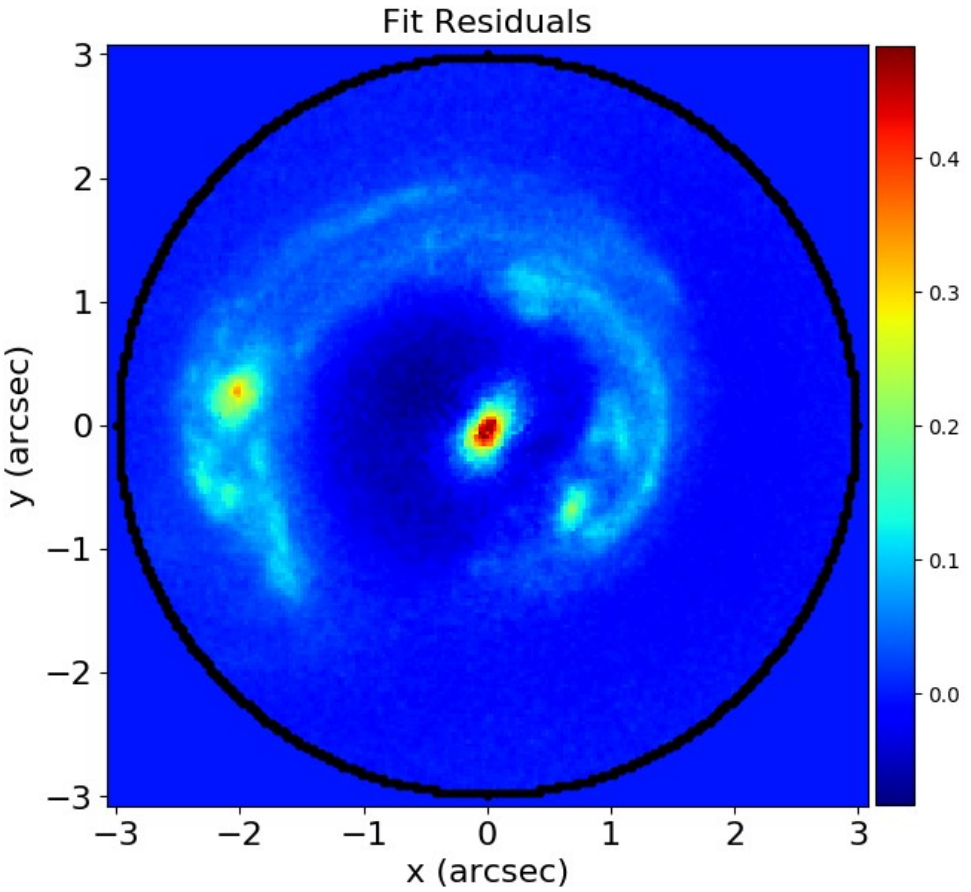
- **Software library that allows Bayesian model fitting pipelines to be built in a general way.**

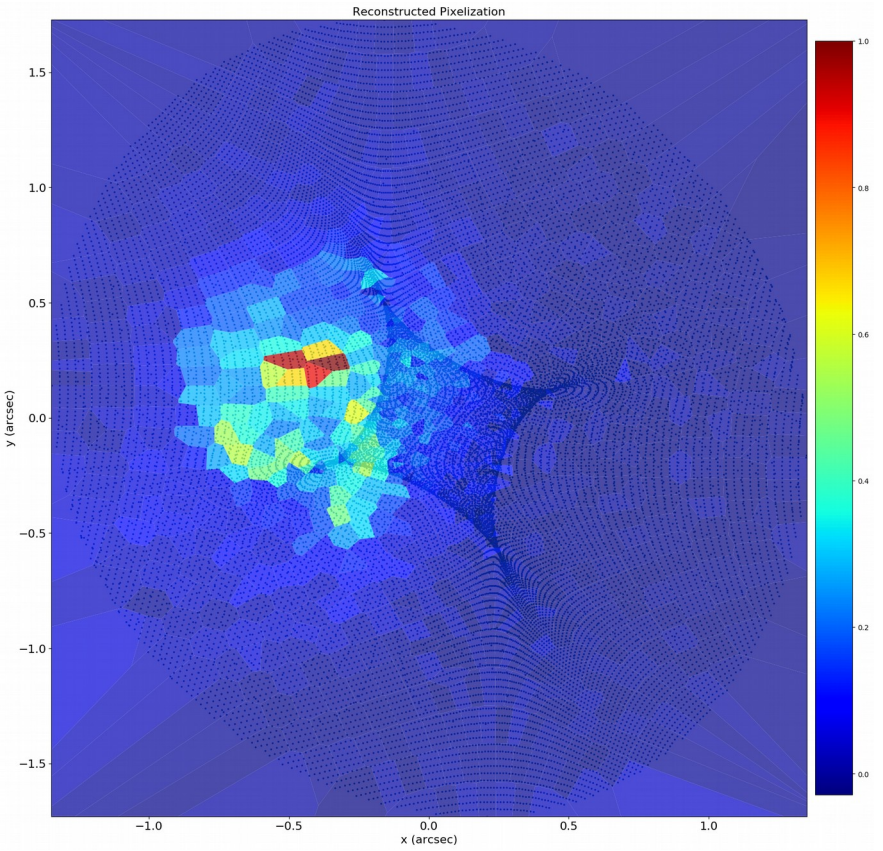
  - Link together different non-linear optimizers.

  - Advanced statistical inference techniques (hierachical models, transdimensional fitting).

  - Handles model setup, configs, visualization, etc.

Use-case: PyAutoLens

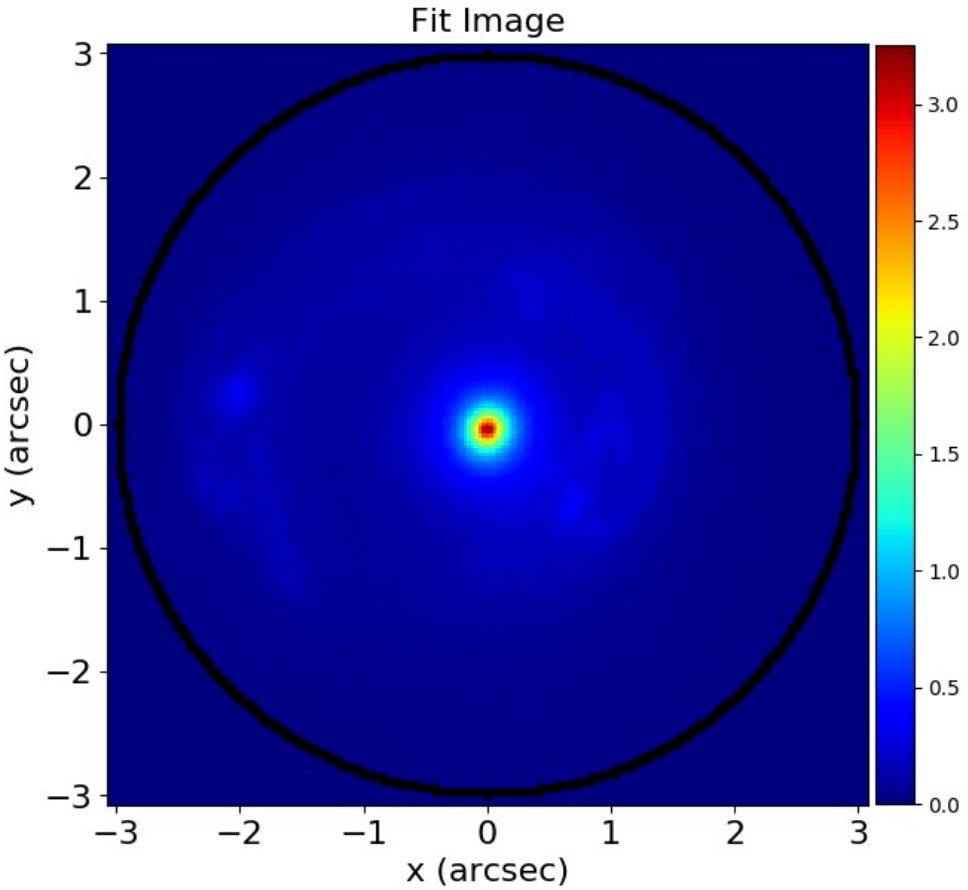


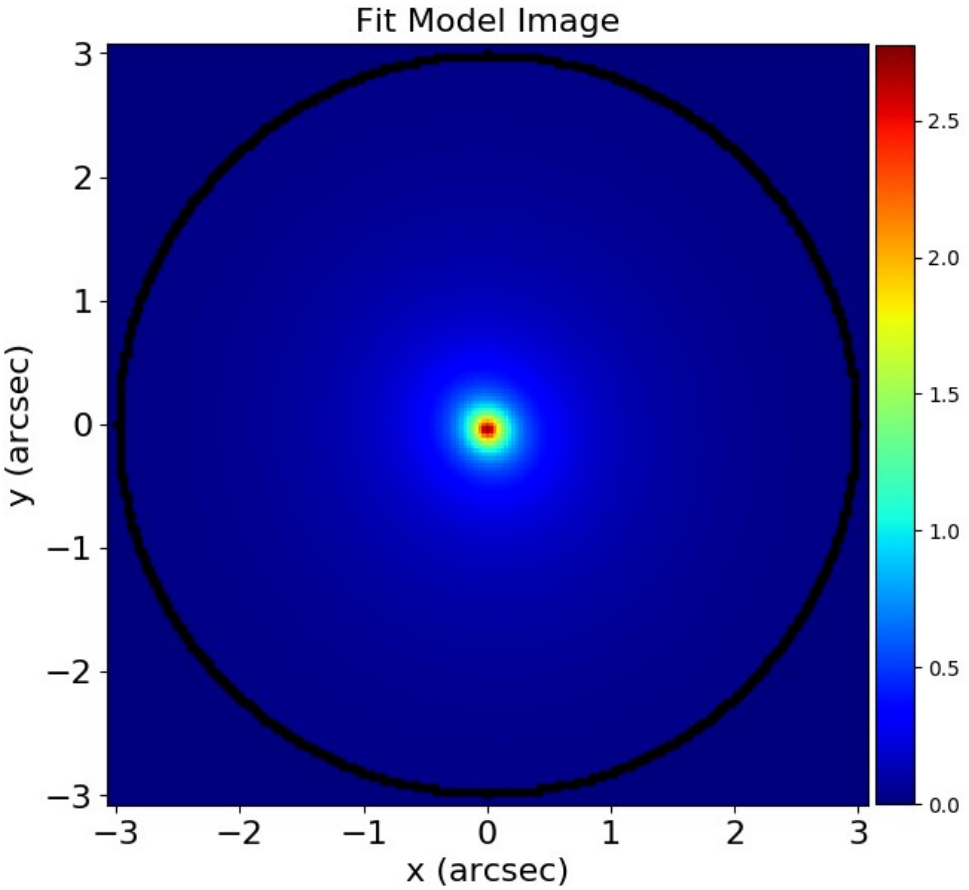


Use-case: PyAutoLens

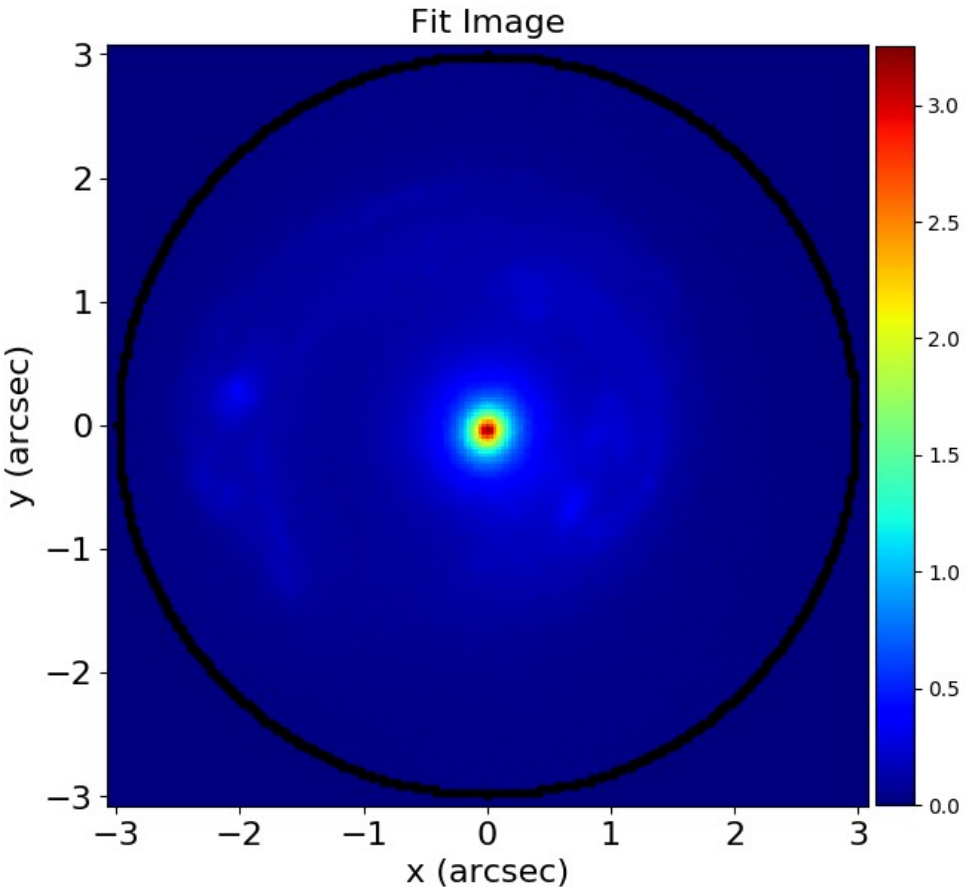
- **Checkout our poster 9.6!**
- **Traditional analysis would fit the lens's light, mass and source simultaneously.**
- **With PyAutoFit, we break this fit down into 3 phases.**

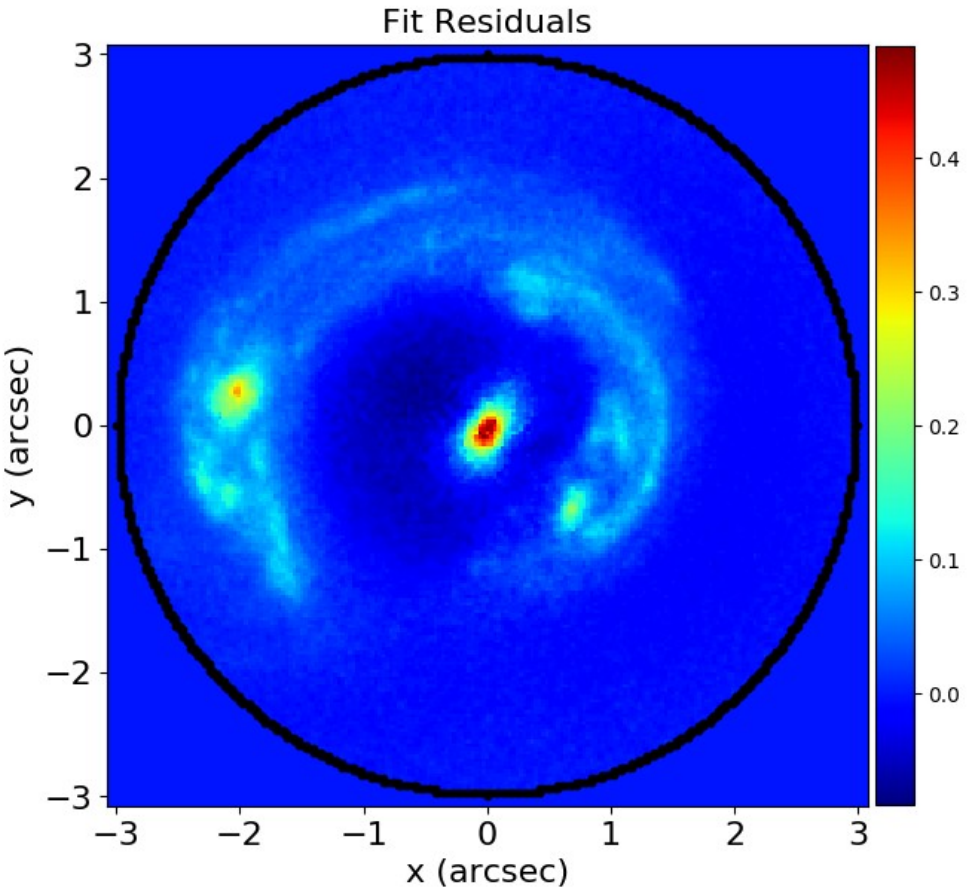
Phase 1 – Lens's Light



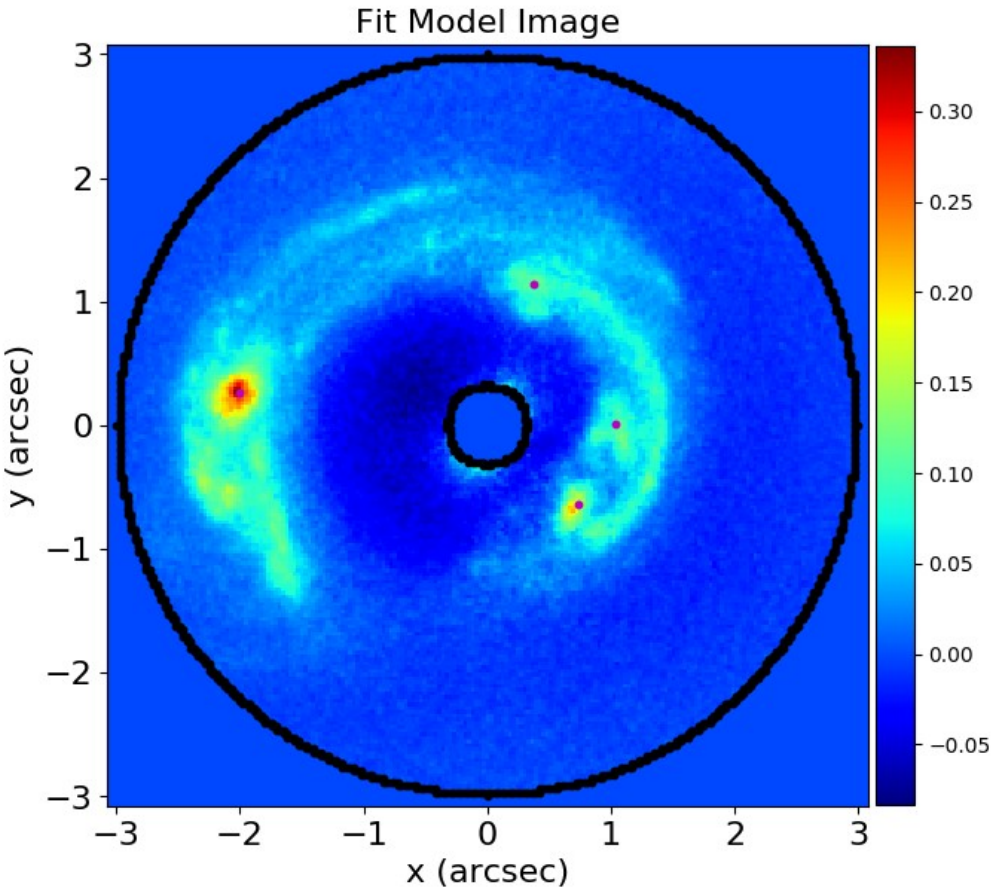


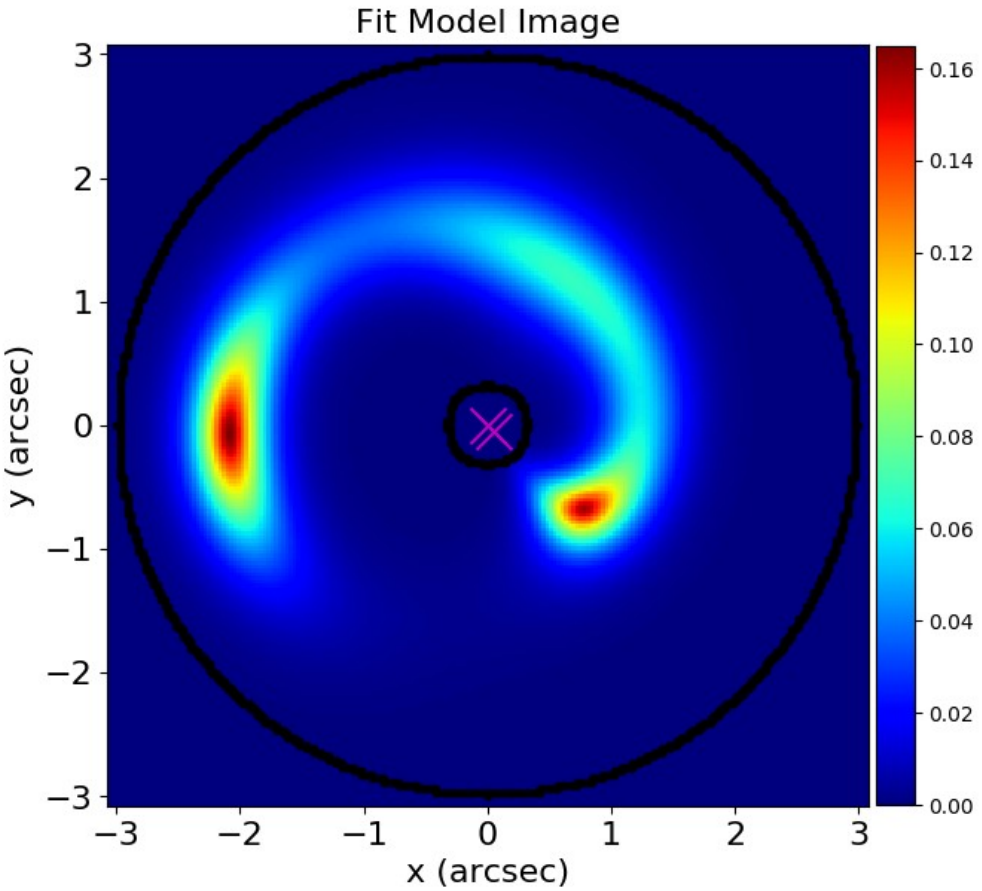
Phase 1 – Lens's Light





Phase 2 – The Source





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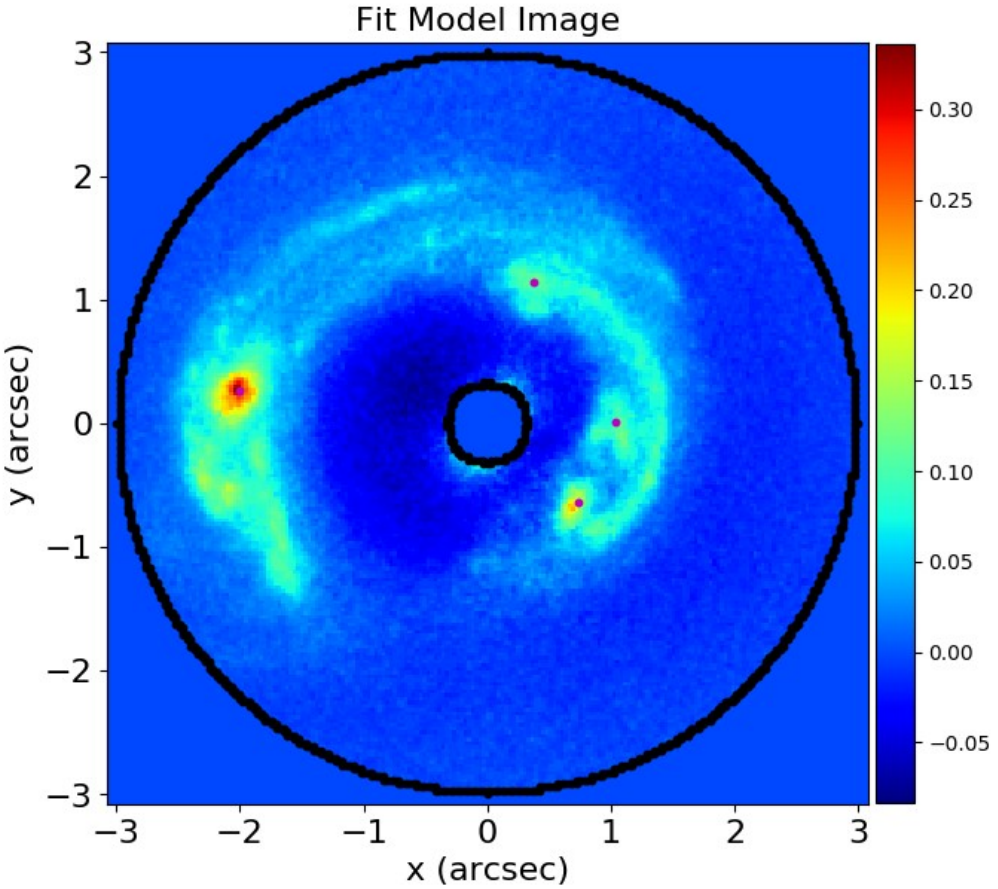
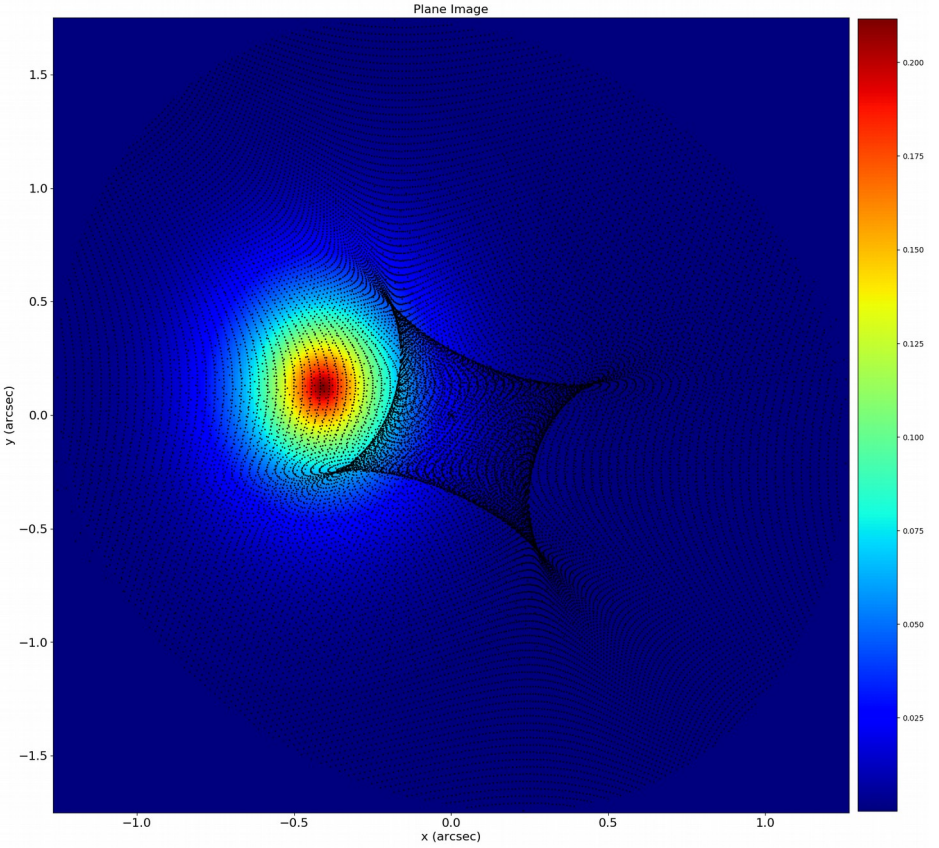
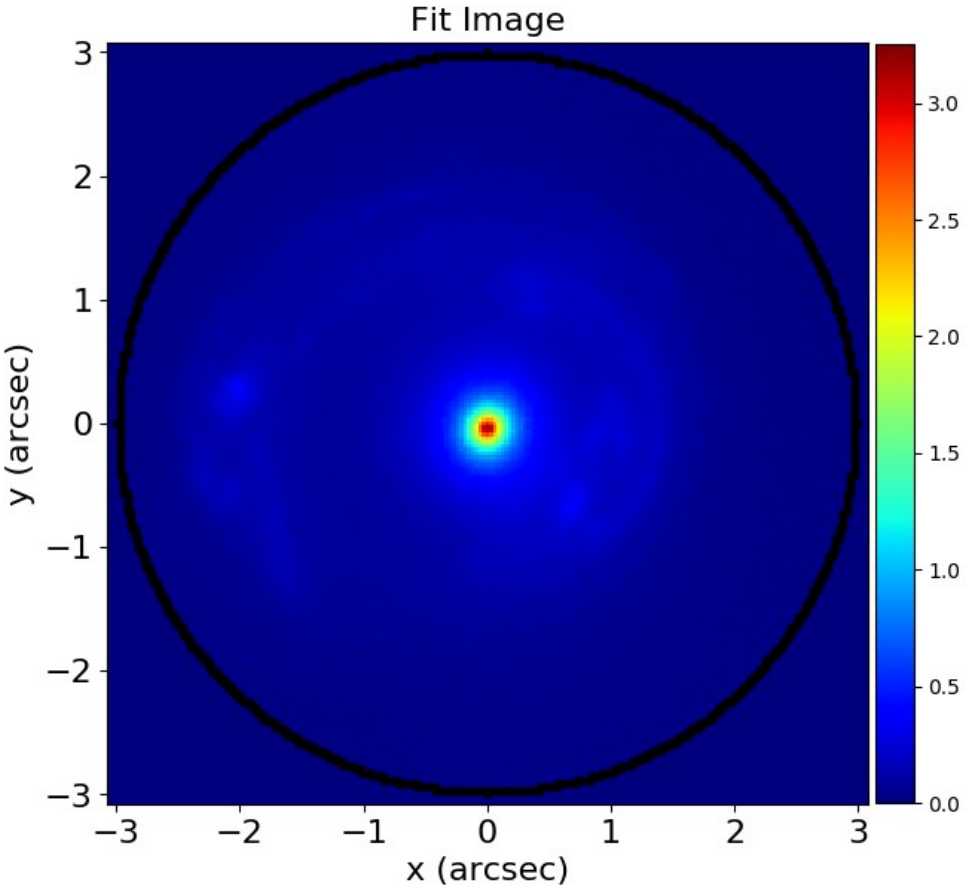
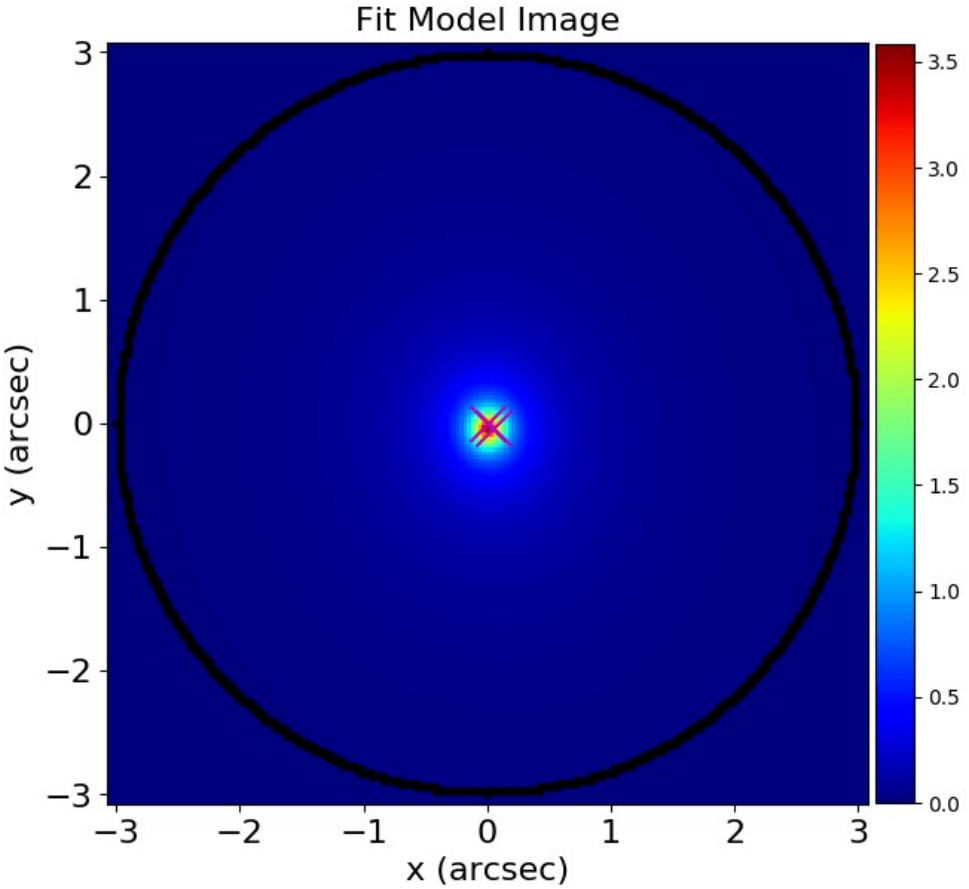




Phase 3 – Fit Both!





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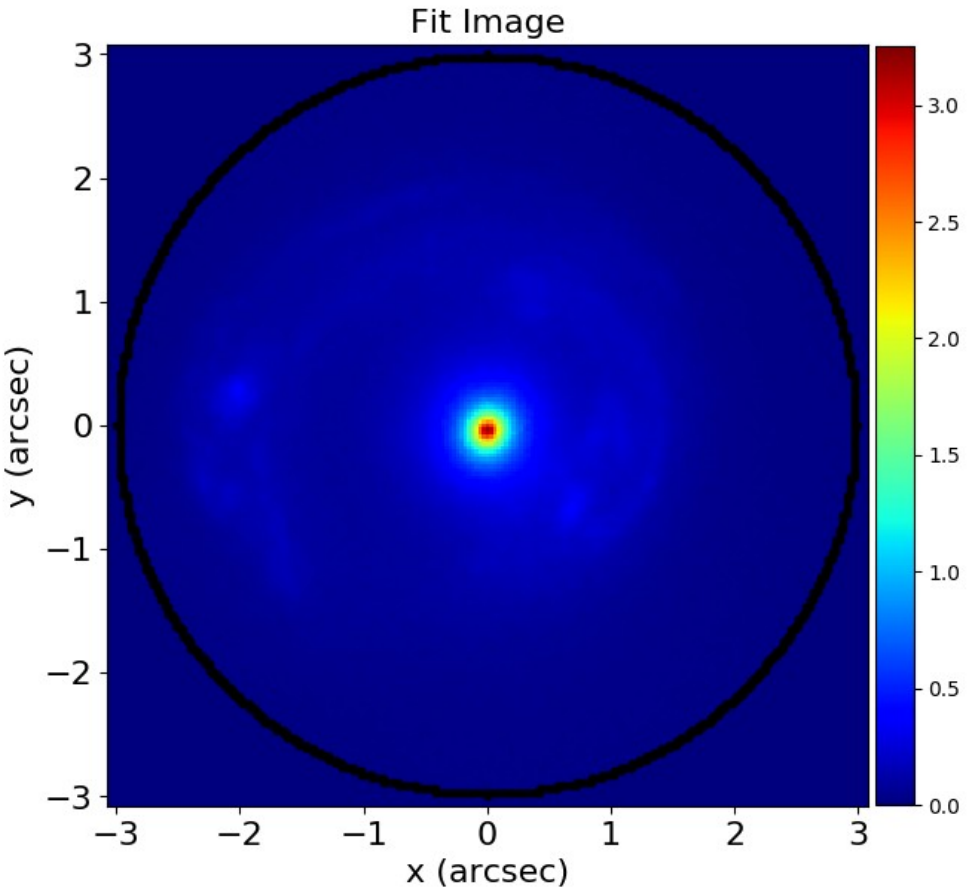

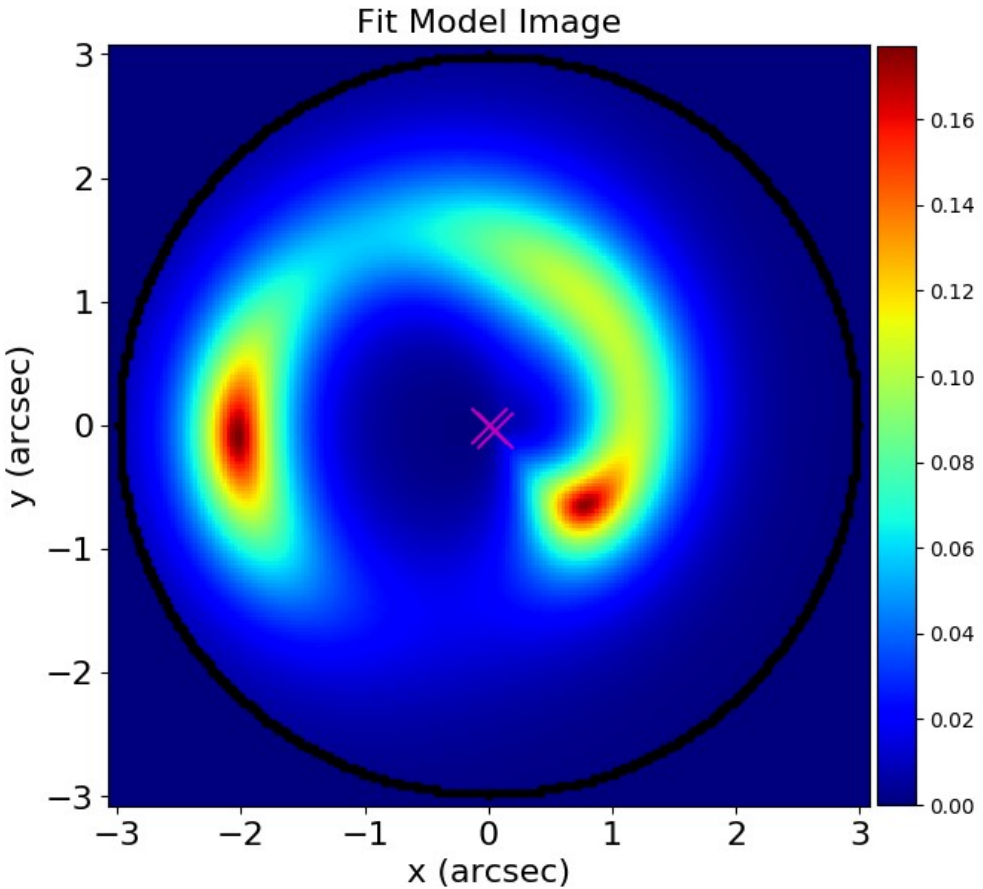

PyAutoFit

- **Poster 3.7:**

  Opposite bar where coffee is served
- **Github:**

  https://github.com/rhayes777/PyAutoFit