# Using Microlensing to Investigate Macro-Models of the Supernova iPTF16geu

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#### Supernova iPTF16geu: Observations and Macro-Models



Source: More, Suyu, et al. (2017)

#### Discrepancy between Observations and Models

- More, Suyu, et al. (2017):
  - "Furthermore, the fluxes of most of the supernova images depart from expected values suggesting that they are affected by microlensing."
  - "The most likely explanation for highly anomalous fluxes is microlensing due to stars in the foreground lens galaxy."
- **Question:** Is microlensing the explanation for anomalous fluxes?

### Simulating the Microlensing of the System



Ran Microlensing simulations for  $\sim 5\%$ ,  $\sim 20\%$ ,  $\sim 33\%$ ,  $\sim 50\%$ , and  $\sim 100\%$  stellar content



Schechter and Wambsganss (2002)

#### Using Observed-Predicted Value to Understand Microlensing Plausibility

#### Supernova Known Likelihood:

Assume that the intrinsic brightness of the supernova is known. If the model is correct, then we have solid predictions.

*Known Likelihood* = Product of the probability density of the 4 images at the observation

Supernova Unknown Likelihood:

If the brightness of the supernova is unknown, we don't know by how much the prediction is off and so must integrate over the x-axis.

*Unknown Likelihood* = Total area under the product of the complete probability density curves of the 4 images



#### Results: 1000 Simulations



## Next Steps

- Will look into other Macro-Models that may fit observations more precisely
- Thank you!