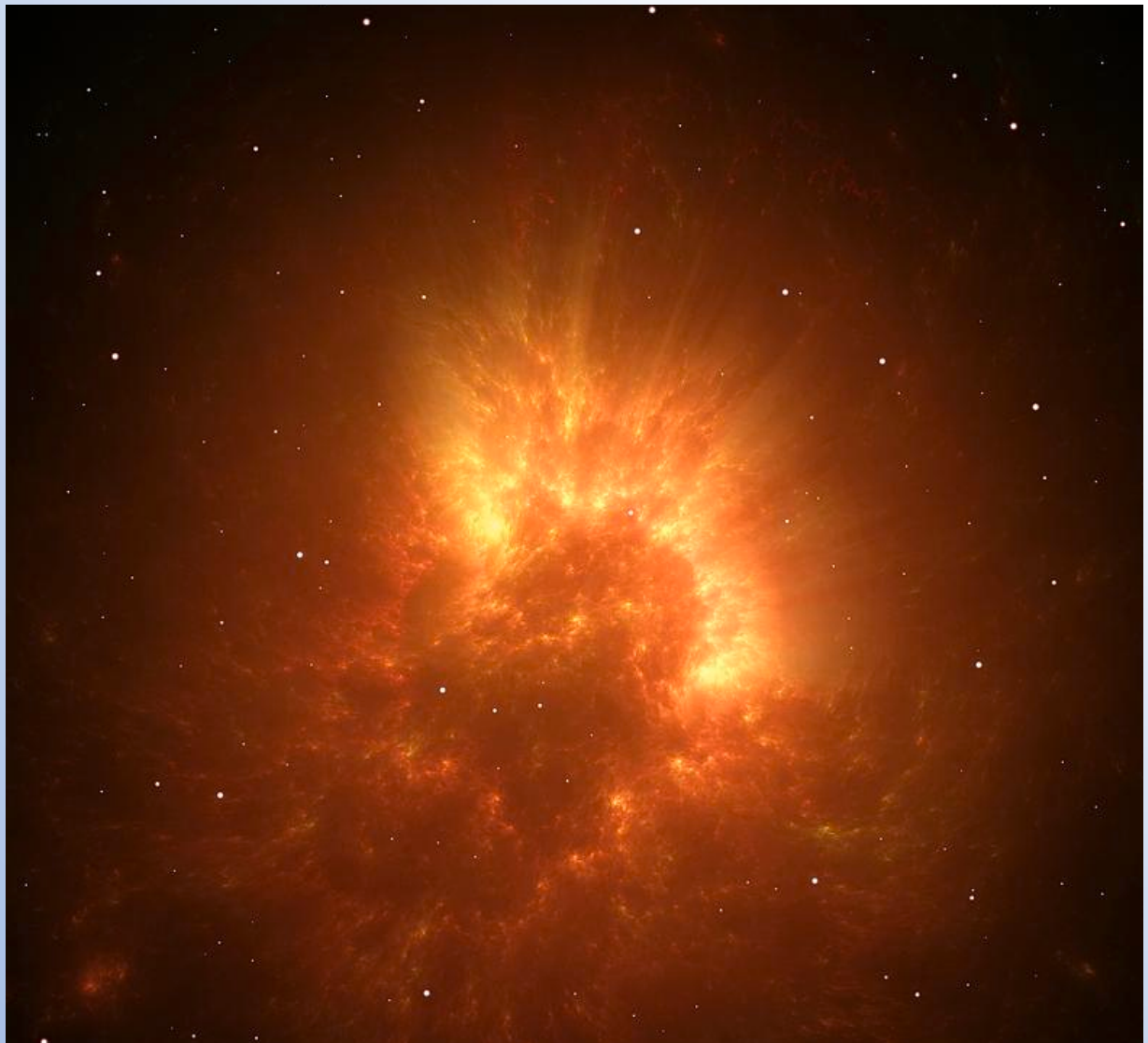


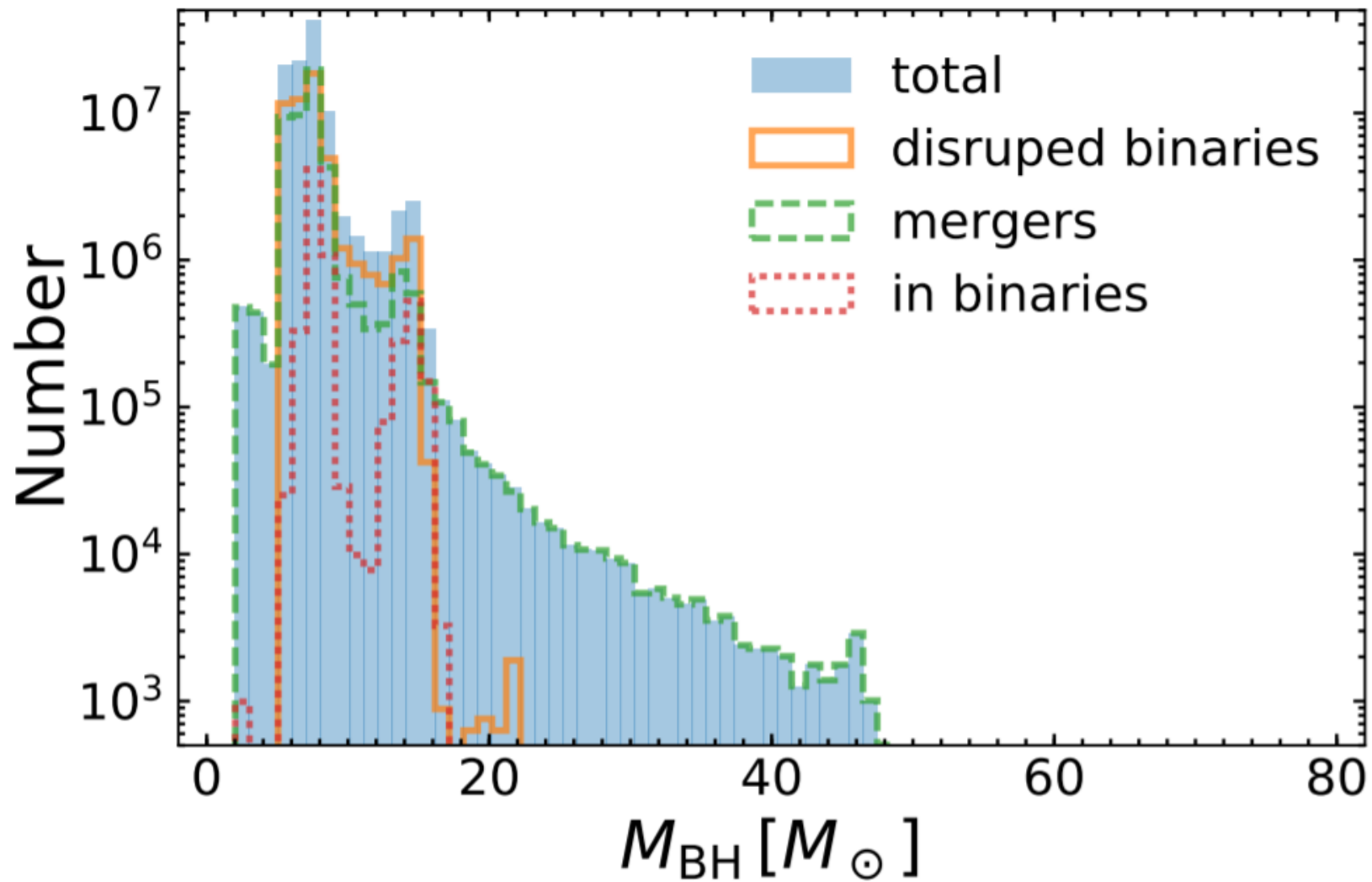
Microlensing through binary black holes

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Black holes in the Milky Way

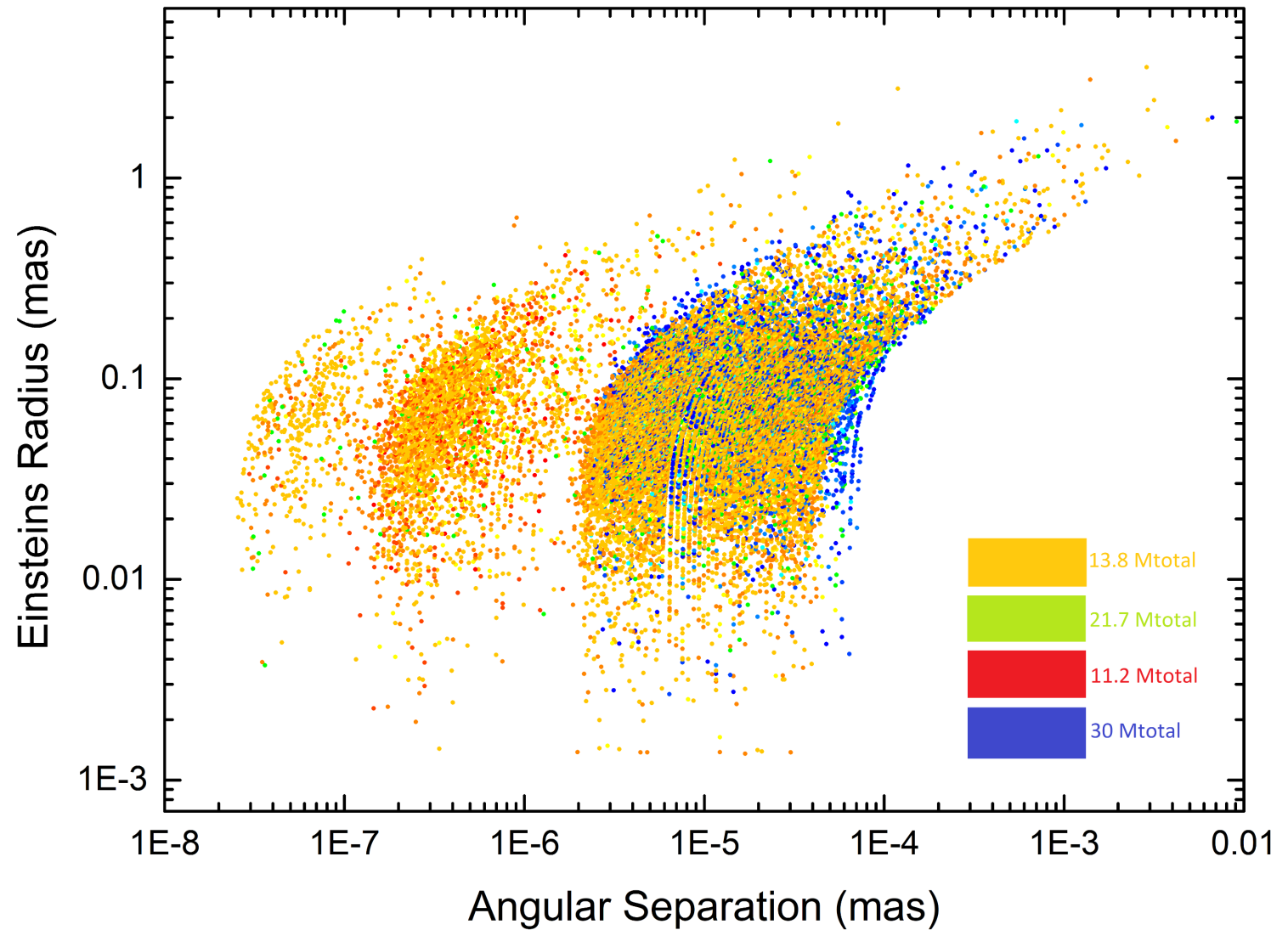
- Complicated stellar system, multiple star formation bursts
- Hard to predict BH populations
- Following most recent model it is thought the population is dominated by single BHs that originate from binary disruptions and mergers.





BH mass distribution for single BHs (Wiktorowicz et al. 2019)

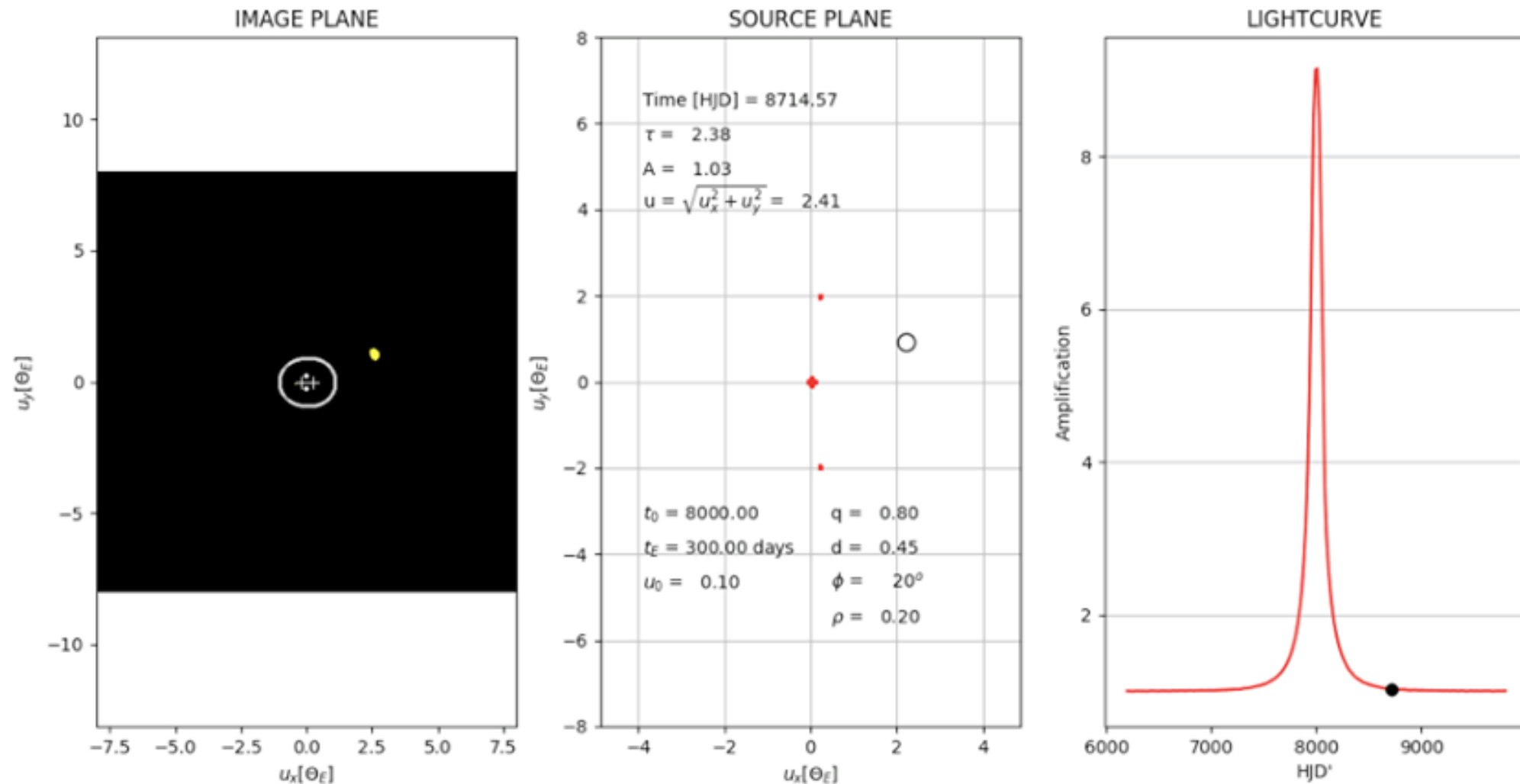
Suspected black hole binaries in the Milky Way



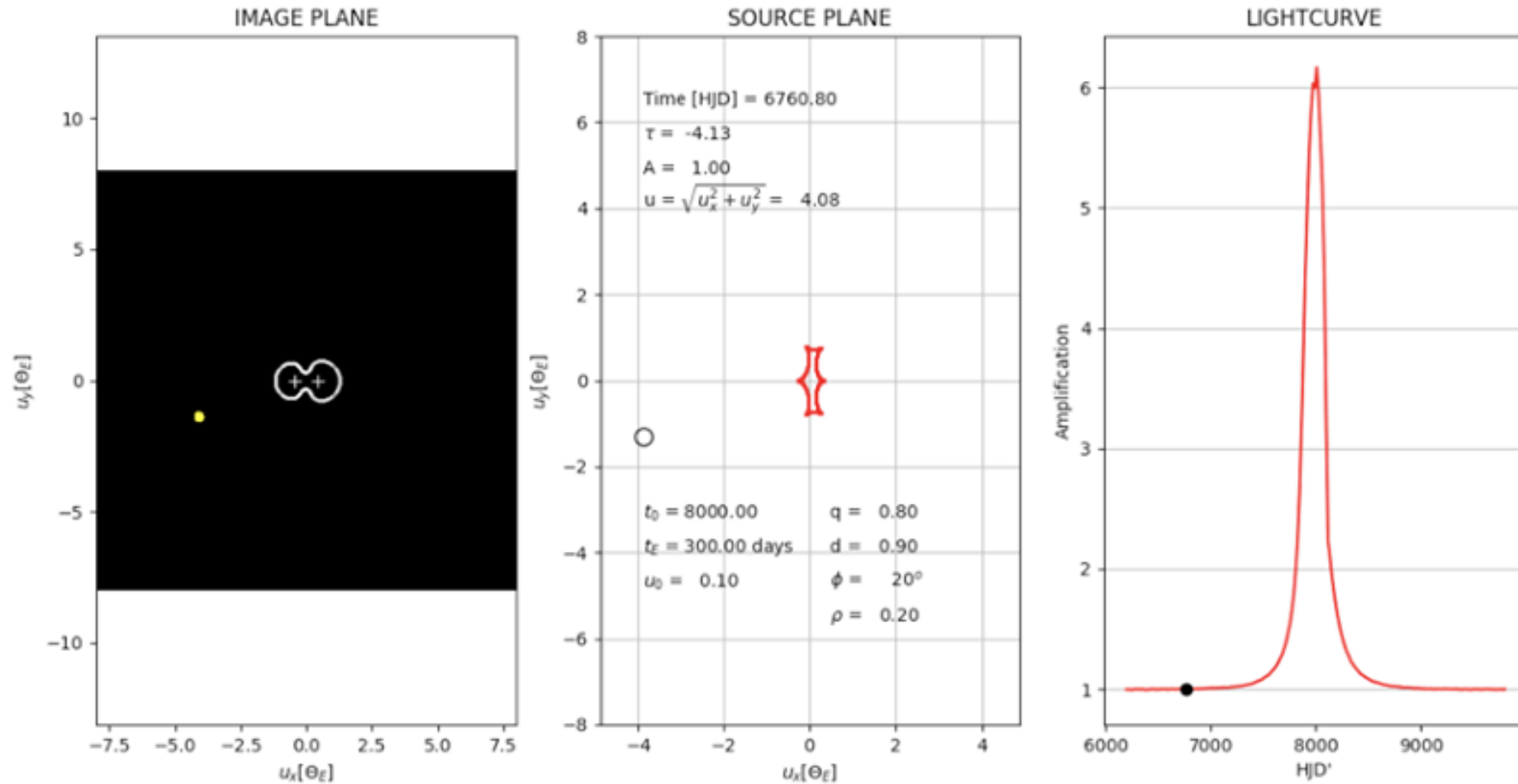
Populations of binary BHs based on separation

- Natal kicks and merging events lead to wide separated BBH systems
- 3 possible gravitational microlensing event outcomes
- Largest mass systems have huge separations, very long orbital periods
- Only 3.8% of BBH lenses are separable events
- >80% are too wide apart

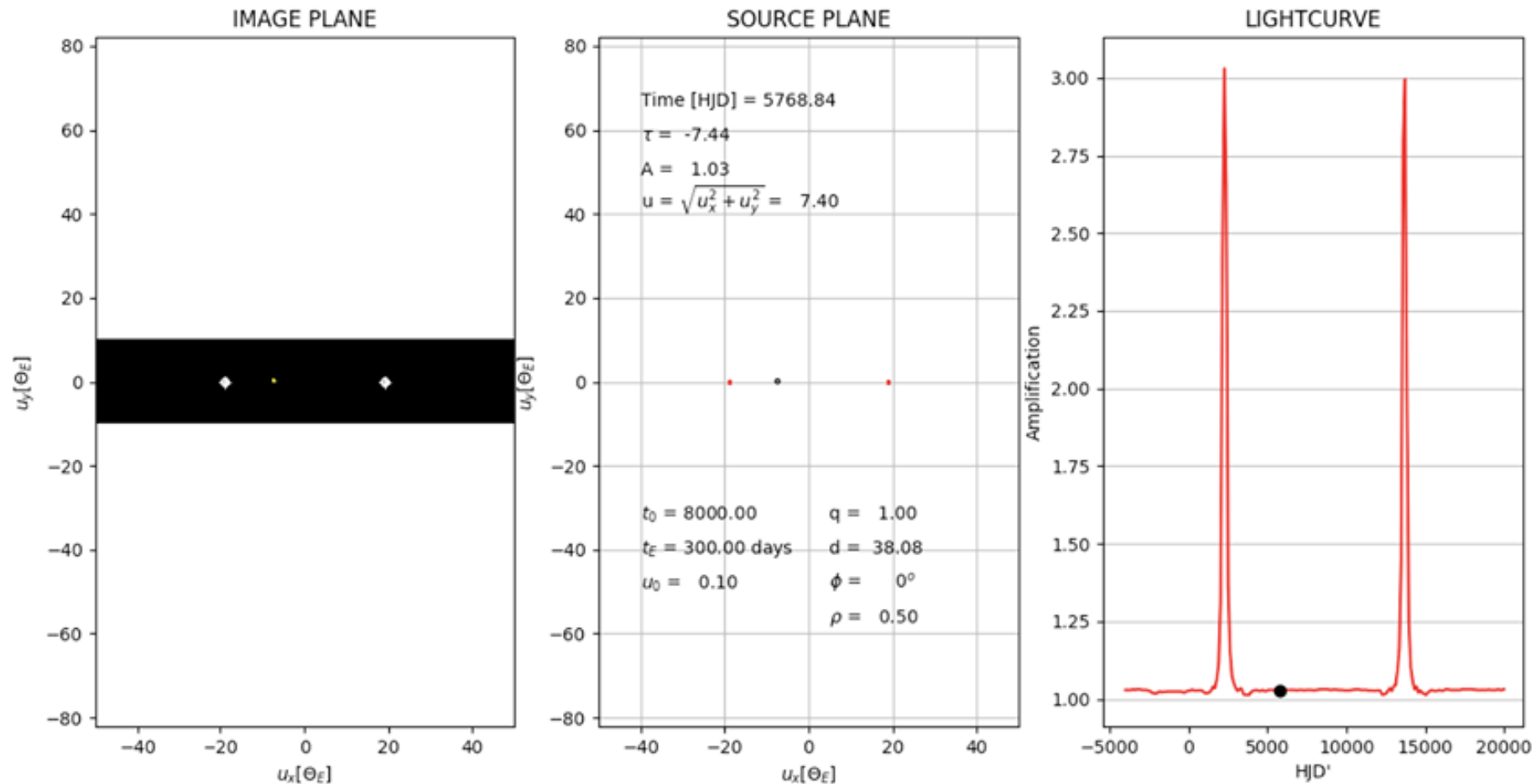
First population: BHs seen as a single lens



Second population: BHs seen as binary lens



Third population: binary BHs seen as separate lens

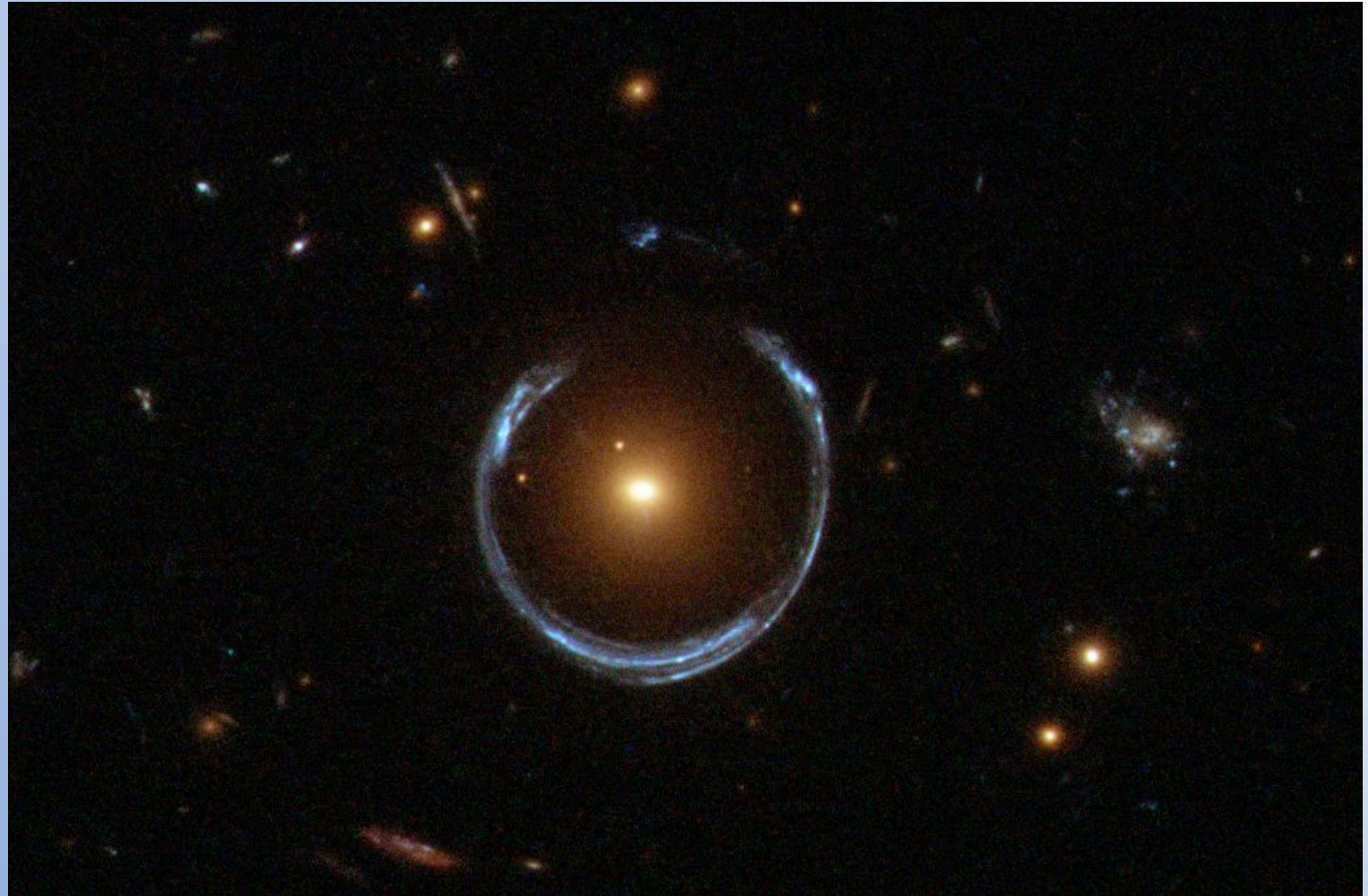


Problem: we cannot confirm black holes being single without checking for companion lens

- Wide separated BHs caustic show us nothing we can rely on to prove there is a companion
- But gravitational potential field is different in a binary system, focused on the inside so the gravitational interaction must change the shape of the lensing event
- Orbital motions play a role in the timespan of the event.

Future of this project

- Hopefully by the time we find next black hole through microlensing the model will be ready to check for possible companion



Thank you for your attention

