Overview of the Hands-On Sessions

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Big Picture

Using simulated WFIRST light curves, explore the kinds of microlensing planets WFIRST will find.

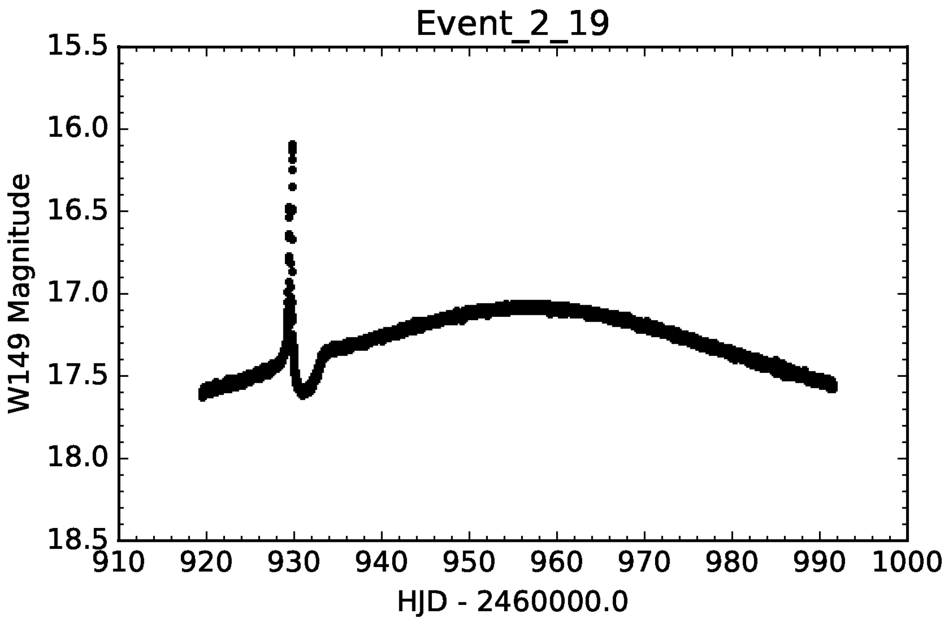
Goals

- Identify planetary perturbations in light curves
- Analytically calculate planetary microlensing parameters based on the light curves
- Perform a numerical fit to determine the exact planetary parameters
- Calculate the physical properties of the planet

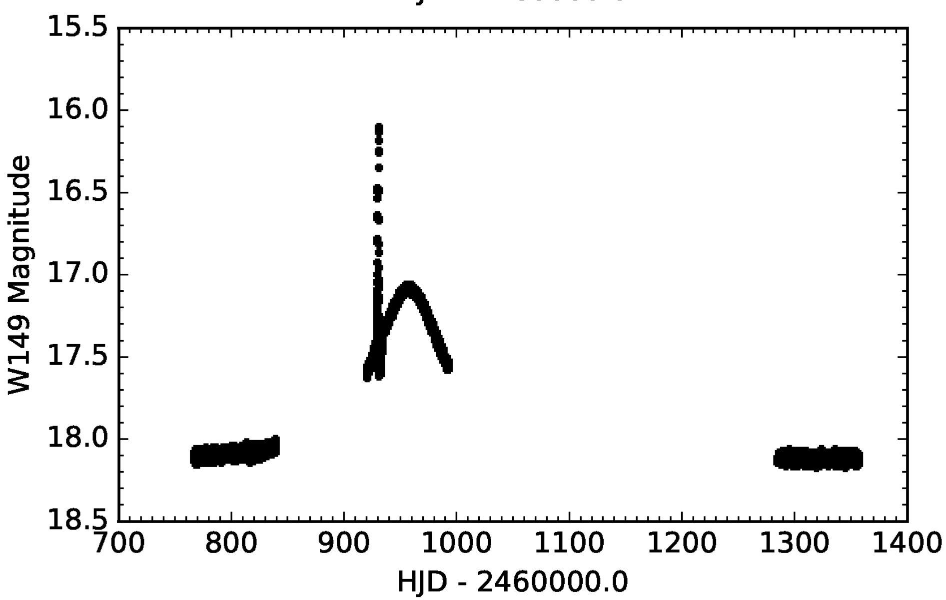
Outline

- Monday:
  - Part I: Classify planets from the literature
  - Part II: Classify planets from simulated WFIRST data
- Tuesday: Calculate the parameters of a planet (Analytic)
- Wednesday: Calculate the parameters of the planet (Numerical)
- Thursday: Prepare presentations

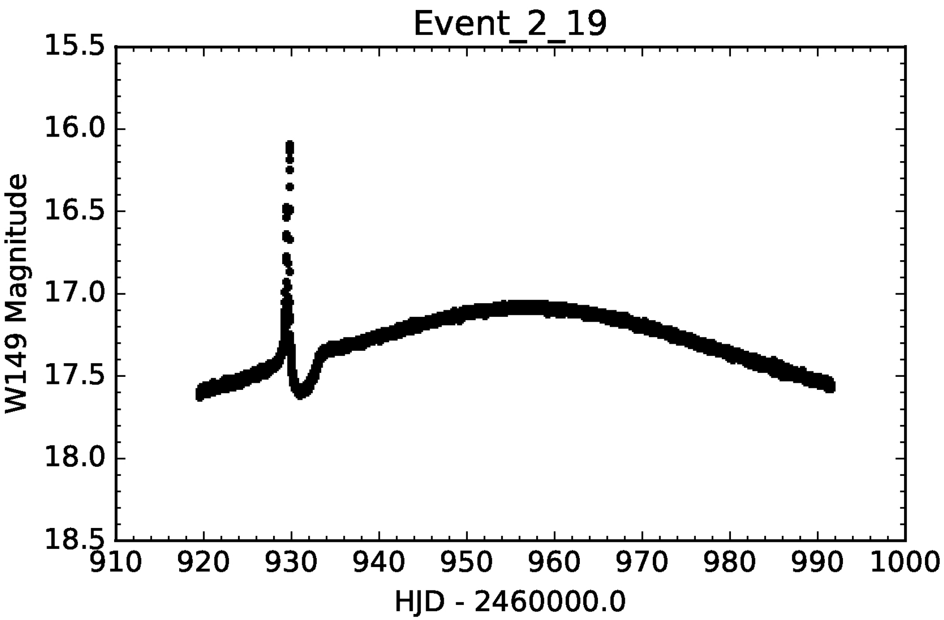
Monday:

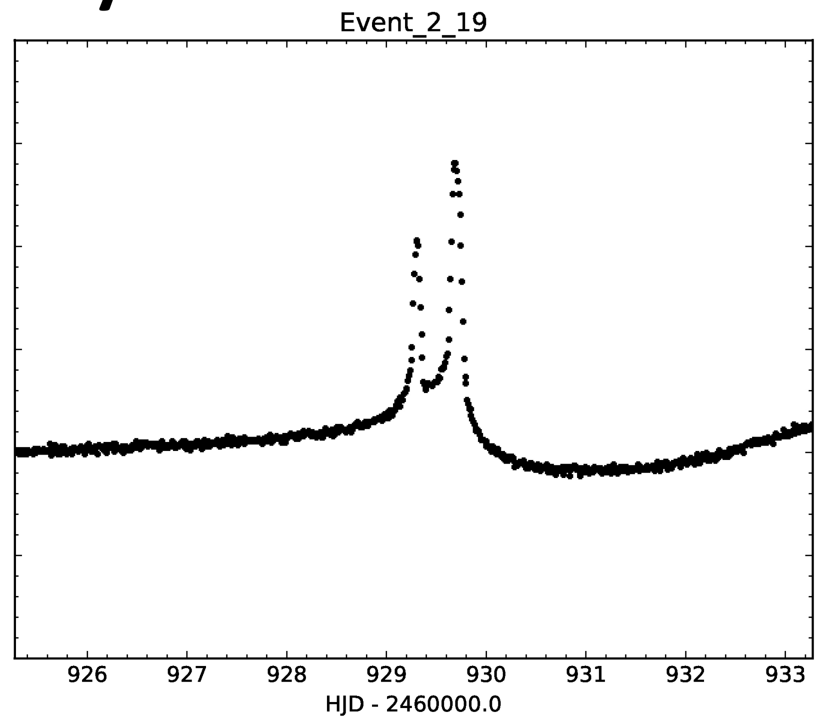


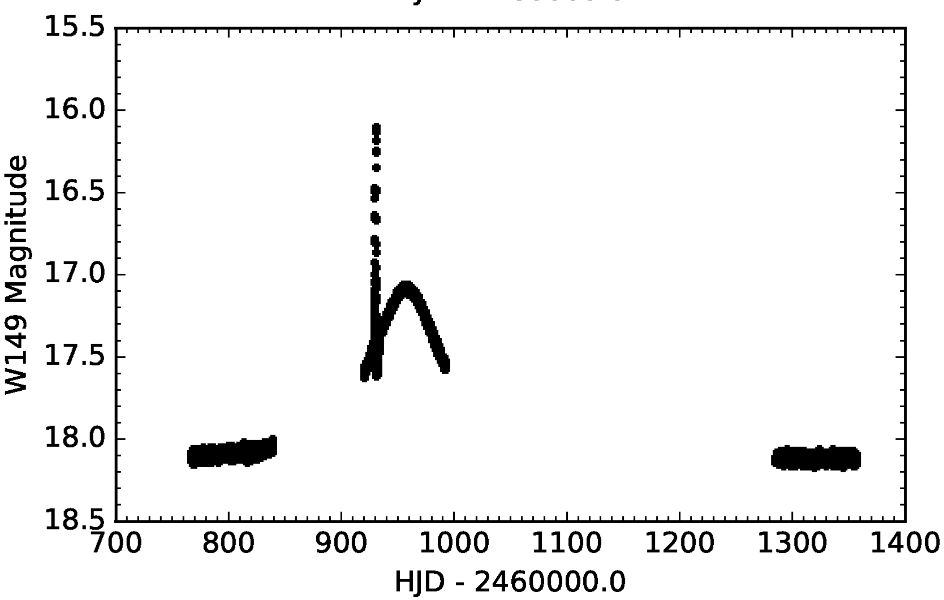
Planet/No Planet?



Tuesday:







microlensing parameters:

t_0, u_0, $t_{E,}$ ρ, s, q, α

Wednesday:

- Compare analytical estimation with the lightcurve
- Fit a single lens model to the lightcurve
- Fitting a planetary model using analytical guess as starting points

Thursday:

- What are the μlensing properties of your planets?
- Show some **plots of your planetary perturbations**.
  - What microlensing features do your planets have in common?
  - Are they major image or minor image perturbations?
  - How long do the perturbations last?
- Make a plot showing the distribution of **mass ratios and separations** for the planets your group analyzed.
  - What is the typical mass ratio for your planets?
  - Are they inside or outside the Einstein ring?
  - Do your planets have a typical separation?

Thursday:

- What are the **physical properties** of your planets?
    - Assuming the lens is a **1.0 MSun G dwarf at 6 kpc**, what does that mean for the physical parameters of the planet (mass and semimajor axis)?
    - Repeat for a **0.3 MSun M dwarf** at 6 kpc.
- For both the G dwarf and M dwarf scenarios, make a plot showing **planet mass vs. physical separation** for your planets.
    - Show the snow line on these plots assuming $a_{snow} = 2.7AU\ (M_* / M_{Sun})^2$
    - How do the physical parameters differ in the two cases?