Dwarf Novae Outburst Model for ELAsTiCC

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Introduction

- Type Ia supernovae are best current probe of relationships between cosmological properties
- KNe can be confused for other faint fast transient phenomena from DESC.
- Aim: build data driven light-curve model for UG dwarf novae for ELAsTiCC data set, for better distinguishment and cosmological understanding.

Methods

- **Taking real instances** from OGLE catalog of Glactic dwarf novae[1] in OGLE V band.
- **Extracting and selecting** 22 UG dwarf novae with good outburst candidates.
- **Light curve modeling** using Bazin function [2]
- **Calculating accretion rate and luminosity** in *ugrizy* band assuming standard disk spectrum model [5].
  - With distance from GAIA [6] (1 arcsecond scope):
    Subtracting extinction from Bayestar [3] or SFD [4] before modeling.
  - Without distance from GAIA:
    Normalizing data by assuming peak accretion rate of 4e-8 $M_\odot$/yr and distance of 1 kpc before modeling.
- **Generating 100k continuous model** in LCLIB file format for SNANA, following galaxy dust distribution [7], and applying extinction from SFD and Bayestar.

Results

Using one extracted outburst from OGLE BLG-DN-0826 for pipeline demonstration.

1 Extract Outburst

Setting specific parameters for increasing and falling stage to extract bright and long enough outburst.

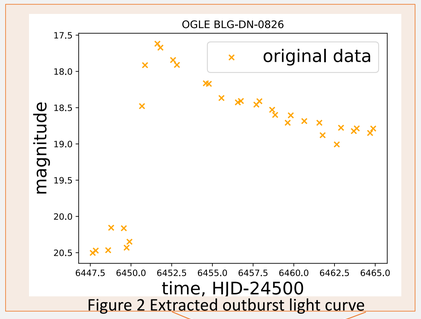

Figure 2 Extracted outburst light curve

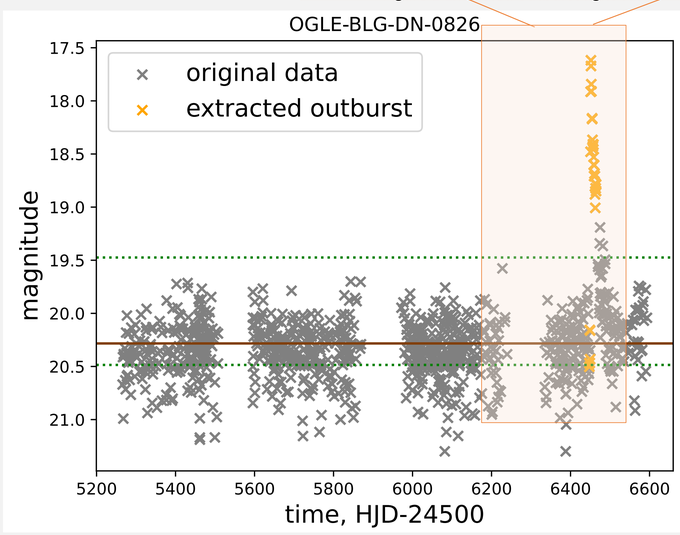

Figure 1. OGLE BLG-DN-0826 light curve from OGLE.

2 Model Outburst

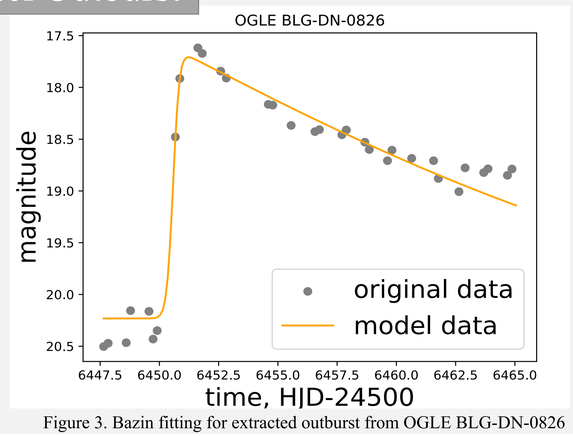

Figure 3. Bazin fitting for extracted outburst from OGLE BLG-DN-0826

3 Outburst in LSST passbands

- Input OGLE V band magnitude. Derive LSST *ugrizy* magnigude from standard disk model. Extinction not added.

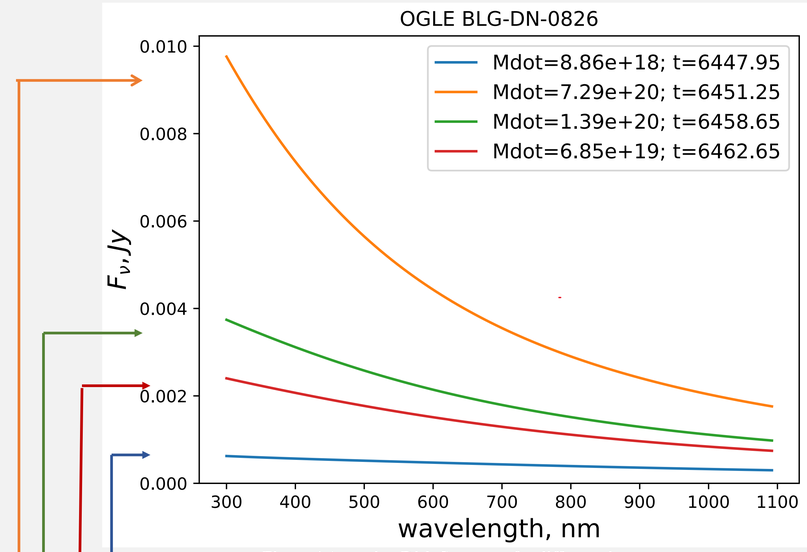

Figure 4 Accretion Disk Spectrum for different time moments

- Slicing four representative time moments (accretion rate) for disk spectrum.
  - One before flux rising phase
  - one at peak flux
  - two after peak flux.

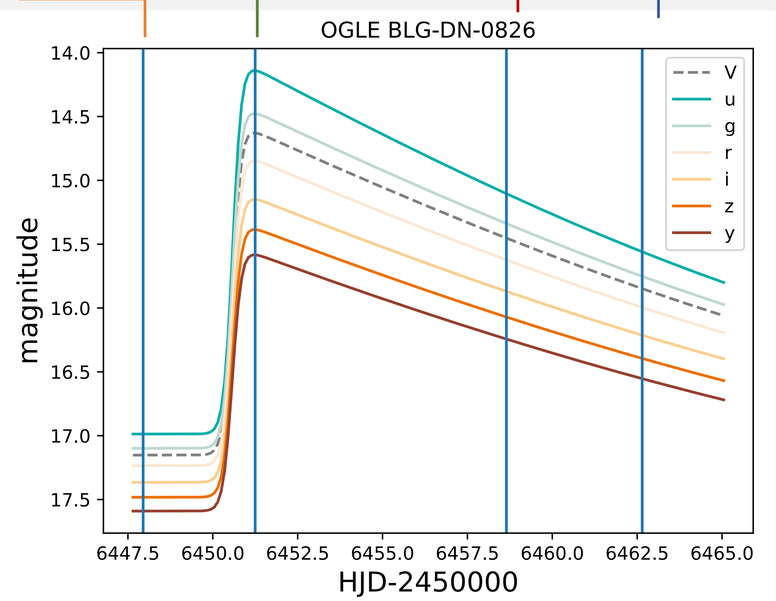

Figure 5 Light curve under LSST passband for the modeled outburst

References

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