extrabol

Release 0.1

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CONTENTS:

extrabol is a Python 3.x package for rapidly and systematicaly estimating the bolometric luminosity and black body properties of (thermal) extragalactic transients from broadband UVONIR data.

CHAPTER

ONE

INSTALLATION

extrabol can be installed via pip

```
pip install extrabol
```

You can also install directly from source (github) using:

```
git clone https://github.com/villrv/extrabol
cd emcee
python -m pip install setup.py
```

This will give you the most up-to-date version of extrabol, but be warned that it may not be stable!

CHAPTER

TWO

QUICKSTART GUIDE

A test example (SN 2010bc, a Type Ia supernova) is included in the package. After installing extrabol, you should be able to run:

```
extrabol ./example/PSc000174_extrabol.dat --verbose -m 1a
```

This example may take a minute the first time you run it as astroquery fetches filter information!

CHAPTER

THREE

INPUT FORMAT

Inputs to extrabol must be .dat files that conform to the following format.

The first two lines must contain redshift and Milky Way extinction E(b-v) respectively. If these values are unknown, simply put 0.0. The following lines contain observational data in 5 columns:

1. Time(MJD)
2. Apparent Magnitude
3. Error(in magnitudes)
4. Filter SVO ID
5. Type of magnitude (AB or Vega)

Any white space can be used as the column delimiter. NaNs, non-detections, and data points with no error bars should not be included. An example input file can be found under `extrabol/example`.

CHAPTER

FOUR

USAGE

extrabol can be used directly from commandline:

```
extrabol 'filename.dat' ARGUMENTS
```

The following arguments are available:

```
--verbose
    Increase output verbosity

-m MEAN, --mean MEAN
    Use a supernova template as the mean function for the GP; Choose \'1a\',\'1bc\', \
↪'2l\', \'2p\', or \'0\' (for no template)
    Default = 0

-t, --show-template
    Shows supernova template on plots as dotted lines

-d DIST, --dist DIST
    Object luminosity distance in Mpc

-z REDSHIFT, --redshift REDSHIFT
    Object redshift
    If no argument is provided, redshift will be read from the input file

--dm DM
    Object distance modulus

--plot BOOL
    Output plots, Default is TRUE

--outdir OUTDIR
    A file location for outputs to be written to

--ebv EBV
    Milky Way extinction E(B-V) value, if known
    If no argument is probided the extinction will be read from the input file

--hostebv HOSTEBV
    Host extinction E(B-V)

-s START, --start START
```

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```
    Start time of analysis window relative to peak luminosity
    Default = -50 days

-e END, --end END
    End time of analysis window relative to peak luminosity
    Default = 150 days

-snr SNR
    Minimum signal to noise ratio for observations
    Default = 4.0

-wc, --wvcorr
    Use the redshift-corrected wavelength values for extinction calculations

-mc, --use-mcmc
    Use a Markov Chain Monte Carlo to fit black bodies instead of curve_fit.
    This provides better error estimates but takes much longer.

--T_max T_MAX
    Modify the prior on temperature for blackbody fits by specifying a maximum␣
↪temperature.
    Default = 40,000K
```

CHAPTER

FIVE

INDICES AND TABLES

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