Libraries & Recommended Citations for using PLAsTiCC Models

(January 4, 2021)

The model libraries in this Zenodo release were used in an LSST classification challenge known as PLAsTiCC: "Photometric LSST Astronomical Time Series Classification Challenge." A scientific description of the models and simulation has been published[1]. The models include transients, variables, photometric redshifts, 3-years of observations, efficiency of spectroscopic confirmation for training set, and efficiency of host-galaxy spectroscopic redshift.

For each model below we give the names of the associated library files, and we recommend model-specific references to cite in further work using these models; a compilation of BibTex entries is provided in bibtex_plasticc_models.bib. Files with an asterisk in front (*) will work only with a 3-year survey, while the other files will work for a survey of arbitrary duration. Also beware that some references are associated with multiple models. To monitor future updates (e.g., improvements or new models) please check this Zenodo link and also http://plasticc.org. To run these models with the SNANA simulation code, contact PLAsTiCC team members for assistance.

Model updates since PLAsTiCC (data files[2] have not been udpated):

- **SNIa-91bg** (2021-01): fixed bug mentioned in Sec 4.2.2 of arXiv:1903.11756.
- **SNIax** (2021-01): Based on a recent analysis,[3] SNIax are corrected for dust extinction using CCM89, $R_V = 3.1$, $E(B-V) = 0.09$ (see Fig. 4 in arXiv:2012.07180).
- **Kilonova** (2021-01): original KN model unchanged; 3 additional models sets added.[4]

Source Models

- **SNIa:**
  Model Library Files:
  SALT2.WFIRST-H17.tar.gz
  SNIa_Extrap_LateTime_2expon.TEXT.gz
  References:
  http://adsabs.harvard.edu/abs/2010A%26A...523A...7G
  http://adsabs.harvard.edu/abs/2013ApJ...764...48K
  http://adsabs.harvard.edu/abs/2018PASP..130k4504P

- **SNIa-91bg:**
  Model Library File:
  Model SIMSED.SNIa-91bg.tar.gz (2021-01: fixed bug after PLAsTiCC)
  References:
  Galbany et al. in prep.

[1] https://ui.adsabs.harvard.edu/abs/2019PASP..131i4501K
[2] https://zenodo.org/record/2539456
[3] https://arxiv.org/abs/2012.07180
[4] https://ui.adsabs.harvard.edu/abs/2019MNRAS.489.5037B

- **SNIax:**
  Model Library File:
  SIMSED.SNIax.tar.gz (2021-01: updated after PLAsTiCC)
  References:
  http://adsabs.harvard.edu/abs/2017hsn..book..375J
  http://github.com/RutgersSN/SNIax-PLAsTiCC

- **SNII:**
  Model Library Files:
  NON1ASED.SNII-Templates.tar.gz
  SIMSED.SNII-NMF.tar.gz
  SIMSED.SNIIn-MOSFIT.tar.gz
  References:
  González-Gaitán et al. in prep.
  http://adsabs.harvard.edu/abs/2010PASP..122.1415K
  http://adsabs.harvard.edu/abs/2018PASP..130k4504P
  http://adsabs.harvard.edu/abs/2018ApJS..236....6G
  http://adsabs.harvard.edu/abs/2017ApJ...849...70V

- **SNIbc:**
  Model Library Files:
  NON1ASED.SNIbc-Templates.tar.gz
  SIMSED.SNIbc-MOSFIT.tar.gz
  References:
  http://adsabs.harvard.edu/abs/2010PASP..122.1415K
  http://adsabs.harvard.edu/abs/2018PASP..130k4504P
  http://adsabs.harvard.edu/abs/2018ApJS..236....6G
  http://adsabs.harvard.edu/abs/2017ApJ...849...70V

- **SLSN-I:**
  Model Library File:
  SIMSED.SLSN-I-MOSFIT.tar.gz
  References:
  http://adsabs.harvard.edu/abs/2018ApJS..236....6G
  http://adsabs.harvard.edu/abs/2017ApJ...850...55N
  http://adsabs.harvard.edu/abs/2009arXiv0911.0680K

- **TDE:**
  Model Library File:
  SIMSED.TDE-MOSFIT.tar.gz
  References:
  http://adsabs.harvard.edu/abs/2018ApJS..236....6G
  http://adsabs.harvard.edu/abs/2018arXiv180108221M
  http://adsabs.harvard.edu/abs/1988Natur.333..523R

- **KN:**
  Model Library File:
  SIMSED.KN-K17.tar.gz
  SIMSED.KN-BULLA19.tar.gz (2021-01: added after PLAsTiCC)
  References:
  http://adsabs.harvard.edu/abs/2017Natur.551...80K
  https://ui.adsabs.harvard.edu/abs/2019MNRAS.489.5037B

- **AGN:**
  Model Library File:
  *LCLIB_AGN-LSST.TEXT.gz
  References:
  http://adsabs.harvard.edu/abs/2010SPIE.7738E..1OC
  http://adsabs.harvard.edu/abs/2010ApJ...721.1014M

- **RRL:**
  Model Library File:
  *LCLIB_RRL-LSST.TEXT.gz
  References:
  http://adsabs.harvard.edu/abs/2010SPIE.7738E..1OC
  http://adsabs.harvard.edu/abs/2010ApJ...708..717S

- **Flaring M-Dwarfs**
  References:
  http://adsabs.harvard.edu/abs/2010SPIE.7738E..1OC
  http://adsabs.harvard.edu/abs/2011PhDT.......144H
  http://adsabs.harvard.edu/abs/2014ApJ...797..122D

- **EB:**
  Model Library File:
  *LCLIB_EB-PHOEBE.TEXT.gz
  References:
  https://ui.adsabs.harvard.edu/#abs/2005ApJ...628..426P
  https://ui.adsabs.harvard.edu/#abs/2016ApJS..227...29P
  https://ui.adsabs.harvard.edu/#abs/2018ApJS..237...26H

- **Mira:**
  Model Library File:
  *LCLIB_MIRA_ISW2011.TEXT.gz
  References:
  http://adsabs.harvard.edu/abs/2011MNRAS.418..114I

- **μLens-Single:**
  Model Library Files:
  *LCLIB_uLens-Single-PyLIMA.TEXT.gz
  *LCLIB_uLens-Single-GenLens.TEXT.gz
  References for PyLIMA:
  http://adsabs.harvard.edu/abs/1986ApJ...304....1P
  http://adsabs.harvard.edu/abs/2000ApJ...542..785G
  http://adsabs.harvard.edu/abs/2012RAA....12..947M
  References for GenLens:
  https://ui.adsabs.harvard.edu/#abs/2000ApJ...541..587D
  https://ui.adsabs.harvard.edu/#abs/2012ApJS..201...21D
  http://ogle.astrouw.edu.pl

- **μLens-Binary:**
  Model Library File:
  *LCLIB_uLens-Binary.TEXT.gz
  References:
  https://ui.adsabs.harvard.edu/#abs/1997ApJ...488...55D
  https://ui.adsabs.harvard.edu/#abs/2008ApJ...686..785N
  https://github.com/ArturoAve/microlensing

- **ILOT**
  Model Library File:
  SIMSED.ILOT-MOSFIT.tar.gz
  References:
  http://adsabs.harvard.edu/abs/2018ApJS..236....6G
  http://adsabs.harvard.edu/abs/2017ApJ...849...70V

- **CaRT:**
  Model Library File:
  SIMSED.CART-MOSFIT.tar.gz
  References:
  http://adsabs.harvard.edu/abs/2018ApJS..236....6G
  http://adsabs.harvard.edu/abs/2017ApJ...849...70V
  http://adsabs.harvard.edu/abs/2012ApJ...755..161K

- **PISN:**
  Model Library File:
  SIMSED.PISN-MOSFIT.tar.gz
  References:
  http://adsabs.harvard.edu/abs/2018ApJS..236....6G
  http://adsabs.harvard.edu/abs/2017ApJ...849...70V
  http://adsabs.harvard.edu/abs/2011ApJ...734..102K

- **μLens-String:**
  Model Library File:
  *LCLIB_uLens-String.TEXT.gz
  References:
  http://adsabs.harvard.edu/abs/2014PhRvD..8914003B
  http://adsabs.harvard.edu/abs/2015IJMPD..2430010C
  http://adsabs.harvard.edu/abs/2018JCAP...05..002C

Simulation Models

- **Photo-z:**
  Model Library File:
  LSST_photoz_G18.HOSTLIB.gz
  References:
  http://adsabs.harvard.edu/abs/2018AJ....155....1G

- **Observation Library:**
  Model Library Files:
  *LSST_OBSERVATIONS_DDF.SIMLIB.gz
  *LSST_OBSERVATIONS_WFD.SIMLIB.gz
  LSST_filter_transmissions.tar.gz
  References:
  http://adsabs.harvard.edu/abs/2016SPIE.9910E..13D
  http://adsabs.harvard.edu/abs/2016SPIE.9911E..25
  Biswas et al. 2019, In Prep

- **Spectroscopic Confirmation for Training Subset:**
  Model Library File:
  LSST_SPECEFF_DES+0.2mag.TXT.gz
  References:
  https://ui.adsabs.harvard.edu/#abs/2019MNRAS.485.1171K (Fig. 4)

- **Spectroscopic Redshift of Host Galaxy:**
  Model Library Files:
  LSST+4MOST_zHOST_DDF.DAT.gz
  LSST+4MOST_zHOST_WFD.DAT.gz