

ExoVista Change Log

v2.31

May 2023

Reduced the mini-target list from 10 stars to 8.

Fixed the order of arguments in `mass_to_radius()`.

Cleaned up the command line output to be more informative.

Fixed the numbering of the FITS extensions in the output setup in `generate_scene()`.

v2.3

May 5, 2023

Fixed a fencepost error in plotting the disk brightness in `readfits.py`.

Changed `generate_scene.py` to actually use the “starbase” dict of stellar parameters.

Added sky coordinates and proper motion to the “starbase” dict.

Added the “parsefits.py” script, which parses an output FITS file to create a single-system input file that matches it exactly.

Added `rdust_blowout`, `tsublimate`, and the imaging parameters to the single-system input file format as a new (optional) “Settings” section.

Added `rdust_blowout`, `tsublimate`, and `iwa` to the header of the disk data cube extension in the output FITS file.

Added a “hires” Settings parameter that resets the disk spectral resolution to equal the star/planet spectral resolution. (Default: False. Warning: causes high memory usage.)

Added “HIRES” to the output file name to signal when the high resolution is being used.

Added a $T_{\text{eff}} > 3500$ K restriction to `load_stars.py` based on the range of the Kurucz models.

Added an optional random spread in the phase functions (a parameterized multiplier on the Lambertian).

Added an option to use a stellar spectrum file in place of the Kurucz models (still subject to the bounds of the Kurucz models).

Added an optional random spread in the mass-radius relation based on the “fractional dispersion” hyperparameters of Chen & Kipping (2017).

Fixed a bug that caused zero stars to be assigned to a core for some sizes of target lists (which causes a crash).

Added an example stellar spectrum (Kurucz model for the Sun).

Updated the example output file (our Solar system at 10 pc, 10 year integration).

Added command-line input of file names to `ExoVistaSystem.py`.

Modified `ExoVistaSystem.py` to detect and set the number of disk components based on the input file.

Significant overhaul of `readfits.py`, including improved input handling, backwards compatibility, and outputting the list of transit and eclipse events.

Laid the groundwork for dust emission/absorption spectra generation with the `load_lqabs()` routine in `generate_scene.py` (not yet used).

Fixed a bug that broke RNG seed repeatability in `generate_scene()`.

Fixed a planet-counting bug in `load_scene()`.

Added the new `add_background` module, which generates random extragalactic background sources for a scene.

v2.2

March 23, 2023

Fixed a bug in the output of stellar coordinates.

Added phase angle to the planet data listed in the FITS files.

Added a version number line to the FITS files to allow backward-compatibility of post-processing scripts.

Added transit and eclipse detection.

Added a fifth plot for planet trajectories to `readfits.py`.

Added printing of transit and eclipse times to `readfits.py`.

Shifted the N-body integrator from Python to C++ to speed up integration with transit detection.

Updated post-processing scripts to handle multiple code versions.

Added functionality to `readfits.py` to reenter the FITS file name or number if an error occurs.

Added functionality to `ExoVistaSystem.py` to prompt for an input filename, accept one as a command line argument, and check for the correct “Star, Planets, Disks” format.

Set up `ExoVistaSystem.py` to read the number of disk components from the input file.

Fixed a bug in the coordinate transformations.

Fixed the parameters of the added Earth twins.

Adjusted the Earth twins to zero eccentricity so that the starting phase angle would be exactly 90 degrees.

Ensured `generate_scene()` would report parameters continuing through the desired maximum time. (Note this means there will always be multiple timesteps in the output.)

Fixed a potential bug in coordinate list handling.

Changed `solar_system.dat` from ID -1 to ID 999 for formatting reasons.

Fixed a bug in handling the Earth twin in `load_scene.py` and `readfits.py`.

Fixed a bug that prevented the seeded RNG from returning consistent results.

Updated the user guide and made various revisions for clarity.

v2.1

February 2, 2023

Added an RNG “seed” parameter to `defaults.py`.

Added an “`eecprob`” parameter to `defaults.py` that sets the overall likelihood that a planet in the EEC bounding box is in fact an EEC. (Default: 1.0.) Also works if different EECs have different bounding boxes.

Added PDF versions of the User Guide and Change Log.

Split `defaults.py` into a `constants.py` parameter list containing values that should not be changed, and a `settings.py` dataclass containing all of the values that should be user-settable.

Added various parameters to the Settings dataclass: planet parameter limits `emin/emax`, `imin/imax`, `sysimin/sysimax`, `sysPAmin/sysPAmx`; also disk particle size `minsize/maxsize`; also all of the hard-coded disk profile parameters.

Cleaned up the variable lists in `constants` and `settings`.

Added a 10-object target list for testing purposes.

Replaced the file-based MyRng with a seeded Numpy RNG.

Removed the unused `sag13_eta_grid()` function from `generate_planets.py`.

Removed the wrapper function for `generate_scene()` from `ExoVista.py`.

Added a total iteration cap of 200 on the planet creation loop. (Adding a massive planet can render multiple small planets unstable, decreasing the total planet count. A planet added on the next iteration will reset the “non-increasing” step count without a net increase in planet count.)

Tested the stability of the longitude (as opposed to argument) of periastron at low inclinations.

Modified `readfits.py` to not output the phase curve plot if there is only one timestep in the FITS file.

Moved all of the user controls in `readfits.py` to the beginning of the script.

Created a basic user interface for `readfits.py` to select a FITS file from the command line.

Updated the documentation.

v2.0.1

January 27, 2023

Tested `load_scene.py` on v1.3 outputs.

Changed the file read by the MyRNG routine from 10 million random numbers to 1 million in order to comply with Github’s file size limits.

Added change log.

Added README instructions.

v2.0

January 26, 2023

First public Python release.