Microlensing parameters in `MulensModel`

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Microlensing parameters in `MulensModel` class `ModelParameters` are presented on the next page:

Parameter	Name in `MulensModel`	Unit	Description
t_0	`t_0`		The time of the closest approach between the source and the lens.
u_0	`u_0`		The impact parameter between the source and the lens center of mass.
t_{E}	`t_E`	d	The Einstein crossing time.
t_{eff}	`t_eff`	d	The effective timescale, $t_{\mathrm{eff}} \equiv u_0 t_{\mathrm{E}}$.
ρ	`rho`		The radius of the source as a fraction of the Einstein ring.
$t_\star$	`t_star`	d	The source self-crossing time, $t_\star \equiv \rho t_{\mathrm{E}}$.
$\pi_{\mathrm{E},N}$	`pi_E_N`		The North component of the microlensing parallax vector.
$\pi_{\mathrm{E},E}$	`pi_E_E`		The East component of the microlensing parallax vector.
$t_{0,\mathrm{par}}$	`t_0_par`		The reference time for parameters in parallax models.[a]
K	`convergence_K`		External mass sheet convergence.
G	`shear_G`		External mass sheet shear; complex valued to represent both the magnitude and angle relative to the binary axis.
s	`s`		The projected separation between the lens primary and its companion as a fraction of the Einstein ring radius.
q	`q`		The mass ratio between the lens companion and the lens primary $q \equiv m_2/m_1$.
α	`alpha`	deg.	The angle between the source trajectory and the binary axis.
ds/dt	`ds_dt`	yr^{-1}	The rate of change of the separation.
$d\alpha/dt$	`dalpha_dt`	deg. yr^{-1}	The rate of change of α.
$t_{0,\mathrm{kep}}$	`t_0_kep`		The reference time for lens orbital motion calculations.[a]
$x_{\mathrm{caustic,in}}$	`x_caustic_in`		Curvelinear coordinate of caustic entrance for a binary lens model.[b]
$x_{\mathrm{caustic,out}}$	`x_caustic_out`		Curvelinear coordinate of caustic exit for a binary lens model.[b]
$t_{\mathrm{caustic,in}}$	`t_caustic_in`		Epoch of caustic exit for a binary lens model.[b]
$t_{\mathrm{caustic,out}}$	`t_caustic_out`		Epoch of caustic exit for a binary lens model.[b]
ξ_P	`xi_period`	d	The orbital period of xallarap.
ξ_a	`xi_semimajor_axis`		The semimajor axis of a xallarap orbit as a fraction of the Einstein ring.
ξ_i	`xi_inclination`	deg	The inclination of a xallarap orbit.
ξ_Ω	`xi_Omega_node`	deg	The longitude of the ascending node of a xallarap orbit.

ξ_u	`xi_argument_of_latitude_reference`	deg	The argument of latitude at the reference epoch ($t_{0,\chi}$). The argument of latitude is a sum of true anomaly (ν, changes with time) and the argument of periapsis (ω, orbit parameter, i.e., does not change with time): $u = \nu + \omega$.
ξ_e	`xi_eccentricity`		The eccentricity of a xallarap orbit.
ξ_ω	`xi_omega_periapsis`	deg	The argument of periapsis of a xallarap orbit.
$t_{0,\xi}$	`t_0_xi`		The reference epoch for parameters in xallarap models.[a]

Table 1: Notes:
[a] – $t_{0,\mathrm{par}}$, $t_{0,\mathrm{kep}}$, and $t_{0,\chi}$ are reference parameters, hence, do not change these during fitting.
[b] – The four parameters of binary lens in Cassan (2008) parameterization ($x_{\mathrm{caustic,in}}$, $x_{\mathrm{caustic,out}}$, $t_{\mathrm{caustic,in}}$, and $t_{\mathrm{caustic,out}}$) are used instead of (t_0, u_0, t_E, and α).

Some of the parameters can be defined separately for each of the sources in binary source models. In that case, add `_1` or `_2` to parameter name. These are:

- `t_0_1`, `t_0_2`,
- `u_0_1`, `u_0_2`,
- `rho_1`, `rho_2`,
- `t_star_1`, `t_star_2`.

Also note that there are properties of the microlensing events that are not considered parameters in the `ModelParameters` class, but are implemented in other parts of the `MulensModel`. The most important are:

- source and blending fluxes – `Event` and `FitData`; also see use case 38,
- sky coordinates – `Model.coords`,
- limb-darkening coefficients – `Model.set_limb_coeff_gamma` and `Model.set_limb_coeff_u`,
- flux ratio for binary source models – `Model.set_source_flux_ratio` and `Model.set_source_flux_ratio_for_band`,
- methods used to calculate magnification – `Model.set_magnification_methods`,
- coordinates of space telescopes – `Model.get_satellite_coords`.