README

The program ***ml_powerlaw_bh_cmd.out*** is based on the fortran code ***ml_powerlaw_bh_cmd.f90***. This program calculates magnification maps for a bimodal microlensing mass distribution: stars + primordial black holes (PBHs), and it can be run on the command line of a Linux OS. You only need to enter the program name and eight optional parameters:

$ ./ml_powerlaw_bh_cmd.out [κ] [γ] [$f_{\rm sdm}$] [N] [P] [$F_{\rm pbh}$] [$r_{\rm pbh}$] [α]

The meaning of these parameters is ($M_{\rm star}$ is the mean stellar mass):

- convergence [κ]
- shear strength [γ]
- mass fraction in smoothly distributed matter (SDM): [$f_{\rm sdm}$] = $\kappa_{\rm sdm}/\kappa$
- map size in Einstein radii on each side [N]$\times R_{\rm E}(M_{\rm star})$
- number of pixels on each side [P]
- PBH fraction of microlenses: [$F_{\rm pbh}$] = $\kappa_{\rm pbh}/(\kappa_{\rm star} + \kappa_{\rm pbh})$
- PBH relative mass in logarithmic scale: [$r_{\rm pbh}$] = $\log(M_{\rm pbh}/M_{\rm star})$
- power-law index of the star mass function [α], where $N(M) \propto M^{-\alpha}$ with $r = M_{\rm max}/M_{\rm min} = 50$
- NOTE: all PBHs have the same mass $M_{\rm pbh}$

It is also possible to see their names by typing

$ ./ml_powerlaw_bh_cmd.out -h

The derived magnification map (file map1.bin) can be seen with the additional python program ***map_view_conv.py***

$ python map_view_conv.py

Maps are obtained for point-like sources, so this additional program also allow you to convolve with a Gaussian brightness profile $I(R) \propto \exp(-R^2/2R_s^2)$. In the example, R_s = 100 pixels.