theia Quick Reference (version 0.1.3)

Key	Input Order and defaults	Action on beams *(Increase of strayness for R on HR, T on HR, R on AR, T on AR)*	Remarks
bo	X, Y, Z = 0 *(origin of bench)*		This will shift all the coordinates of the following optics and beams (until the next bo line) by the amounts given here (blank bo line to return to general system).
bm	Wx = 1.mm, Wy = 1.mm *(waist sizes)*, WDistx = 0., WDisty = 0. *(waist positions from beam origin)*, Wl = 1064.nm, P = 1.W, X = 0., Y = 0., Z = 0. *(position of origin in space)*, Theta = pi/2., Phi = 0. *(orientation)* , Alpha = 0. *(rotation of eigenbase for orthogonal beams)*, Ref = None		Alpha = 0. $\leftrightarrow$ eigen X is $\perp$ to beam direction and has maximum Z component. If direction is $\pm e_Z$ then eigen X is $\pm e_X$
mr	X = 0., Y = 0., Z = 0. *(position of center of HR chord)*, Theta = pi/2., Phi = 0. *(orientation of HR Norm, pointing out)*, Wedge = 0., Alpha = 0. *(wedge and wedge rotation)*, HRK = 0.01, ARK = 0. *(curvatures)*, Diameter = 10.cm *(of the construction cylinder)*, Thickness = 2.cm, N = 1.4585, HRr = .99, HRt = .01, ARr = .1, ARt = .9 *(power reflectances and transmittances)*, KeepI = False, Ref = None	0, +1, +1, 0	Wedges are counted positive if you *add* material when you increase the wedge.
bs	X = 0., Y = 0., Z = 0. *(position of center of HR chord)*, Theta = pi/2., Phi = 0. *(orientation of HR Norm, pointing out)*, Wedge = 0., Alpha = 0. *(wedge and wedge rotation)*, HRK = 0., ARK = 0. *(curvatures)*, Diameter = 10.cm *(of the construction cylinder)*, Thickness = 2.cm, N = 1.4585, HRr = .5, HRt = .5, ARr = .1, ARt = .9 *(power reflectances and transmittances)*, KeepI = False, Ref = None	0, 0, 0, 0	This is very similar to mirror bm, but has diferent default values and never increases the strayness of beams.
th	X = 0., Y = 0., Z = 0. *(position of center of lens)*, Theta = pi/2., Phi = 0. *(orientation of HR Norm, pointing out)*, Focal = 10.cm, Diameter = 5.cm, R = .1, T = .9 *(power reflectance and transmittance, per surface)*, KeepI = False, Ref = False	+1, 0, 0, +1	All parameters which are not present here are internally adjusted in order to fit the input Focal, Diameter and a N = 1.4584 value for the optical index
tk	X = 0., Y = 0., Z = 0. *(position of apex of HR face of lens)*, Theta = pi/2., Phi = 0. *(orientation of HR Norm, pointing out)*, K1 = .01, K2 = .001 *(curvatures)*, Diameter = 5.cm, Thickness = 2.cm, N = 1.4585, R = .1, T = .9 *(power reflectance and transmittance)*, KeepI = False, Ref = None	+1, 0, 0, +1	Thickness: on optical axis (from apex to apex). Note that in this case the provided HR center corresponds to the position of the *apex of the HR surface, on the contrary of mirrors.*
sp	RonHR = 0, TonHR = 0, RonAR = 0, TonAR = 0 *(actions on beams)*, X = 0., Y = 0., Z = 0. *(position of center of HR chord)*, Theta = pi/2., Phi = 0. *(orientation of HR Norm, pointing out)*, Wedge = 0., Alpha = 0. *(wedge and wedge rotation)*, HRK = 0.01, ARK = 0. *(curvatures)*, Diameter = 10.cm, Thickness = 2.cm, N = 1.4585, HRr = .99, HRt = .01, ARr = .1, ARt = .9 *(power reflectances and transmittances)*, KeepI = False, Ref = None	User defined by RonHR, TonHR, RonAR, TonAR	This is the object which allows you to specify exactly the action of each surface on reflected and transmitted beams.
bd	X = 0., Y = 0., Z = 0. *(position of center of HR)*, Theta = pi/2., Phi = 0. *(orientation of HR Norm, pointing out)*, Diameter = 5.cm, Thickness = 2.cm, Ref = None	Stops all beams	
gh	X = 0., Y = 0., Z = 0. *(position of center of HR)*, Theta = pi/2., Phi = 0. *(orientation of HR Norm, pointing out)*, Diameter = 5.cm, Ref = None	Transmits beams without modification, no reflected beam	This component does not affect the beams, but just allows to have a new entry in the output file for the beam emerging from the ghost surface. It does not have a 3D rendering object associated.

Keys. bo (new coordinate origin), bm (input beam), mr (mirror), bs (beam splitter), th (thin lens), tk (thick lens), sp (special surface), bd (beam dump), gh (ghost surface)

Units. (km, m = 1., cm, mm, um, nm), (kW, W = 1., mW, uW, nW), (THz, GHz, MHz, kHz, Hz = 1., mHz, uHz), (ppm = 1.e-6, rad = 1., deg), pi

Functions. sin, cos, tan, arcsin, arccos, arctan, sqrt, exp

Notes.

- Theta, Phi are spherical coordinates around e_Z and Phi = 0. $\leftrightarrow$ $+e_X$
- All constructors can be called without arguments, all parameters have default values.