theia Quick Reference (v. 0.1.2)

Key	Input Order	Defaults	Remarks
bo	X, Y, Z (origin of bench)	X, Y, Z = 0	This will shift all the coordinates of the following optics and beams (until the next bo line) by the amounts given here. If you want to signify that you're back in the general coordinate system, you can put in a blank bo line.
bm	Wx, Wy (waist sizes), WDistx, WDisty (waist positions from beam origin), Wl, P, X, Y, Z (position of origin in space), Theta, Phi (orientation), Alpha (rotation of eigenbase for orthogonal beams), Ref	Wx = 1.mm, Wy = 1.mm, WDistx = 0., WDisty = 0., Wl = 1064.nm, P = 1.W, X = 0., Y = 0., Z = 0., Theta = pi/2., Phi = 0., Alpha = 0., 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, Y, Z (position of center of HR chord), Theta, Phi (orientation of HR Norm, pointing out), Wedge, Alpha (wedge and wedge rotation), HRK, ARK (curvatures), Diameter, Thickness (of the construction cylinder), N, HRr, HRt, ARr, ARt (power reflectances and transmittances), KeepI, Ref	X = 0., Y = 0., Z = 0., Theta = pi/2., Phi = 0., Wedge = 0., Alpha = 0., HRK = 0.01, ARK = 0., Diameter = 10.cm, Thickness = 2.cm, N = 1.4585, HRr = .99, HRt = .01, ARr = .1, ARt = .9, KeepI = False, Ref = None	Wedges are counted positive if you *add* material when you increase the wedge.
th	X, Y, Z (position of center of lens), Theta, Phi (orientation of HR Norm, pointing out), Focal (focal length), Diameter, R, T (power reflectance and transmittance), KeepI, Ref	X = 0., Y = 0., Z = 0., Theta = pi/2., Phi = 0., Focal = 10.cm, Diameter = 5.cm, R = .1, T = .9, KeepI = False, Ref = False	All parameters which are not present here are internally ajusted in order to fit the input Focal, Diameter and a N = 1.4584 value for the optical index
tk	X, Y, Z (position of apex of HR face of lens), Theta, Phi (orientation of HR Norm, pointing out), K1, K2 (curvatures), Diameter, Thickness, N, R, T (power reflectance and transmittance), KeepI,Ref	X = 0., Y = 0., Z = 0., Theta = pi/2., Phi = 0., K1 = .01, K2 = .001, Diameter = 5.cm, Thickness = 2.cm, N = 1.4585, R = .1, T = .9, KeepI = False, Ref = None	Thickness: on optical axis (from apex to apex)
bd	X, Y, Z (position of center of HR), Theta, Phi (orientation of HR Norm, pointing out), Diameter, Thickness, Ref	X = 0., Y = 0., Z = 0., Theta = pi/2., Phi = 0., Diameter = 5.cm, Thickness = 2.cm, Ref = None	
gh	X, Y, Z (position of center of HR), Theta, Phi (orientation of HR Norm, pointing out), Diameter, Ref	X = 0., Y = 0., Z = 0., Theta = pi/2., Phi = 0., Diameter = 5.cm, Ref = None	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), th (thin lens), tk (thick lens), 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.