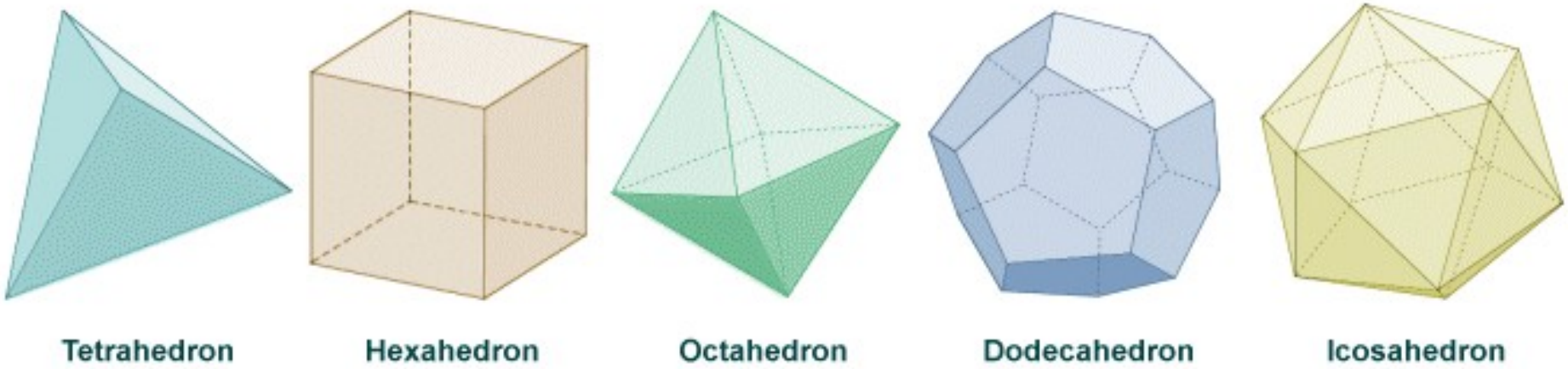
Platonic or Pythagorean Solids



Planetary Orbits

Equation of Ellipse

$$r = \frac{\frac{L^2}{m\alpha}}{1 + \epsilon \cos\theta}$$

"eccentricity" (non-circularity) Of Ellipse

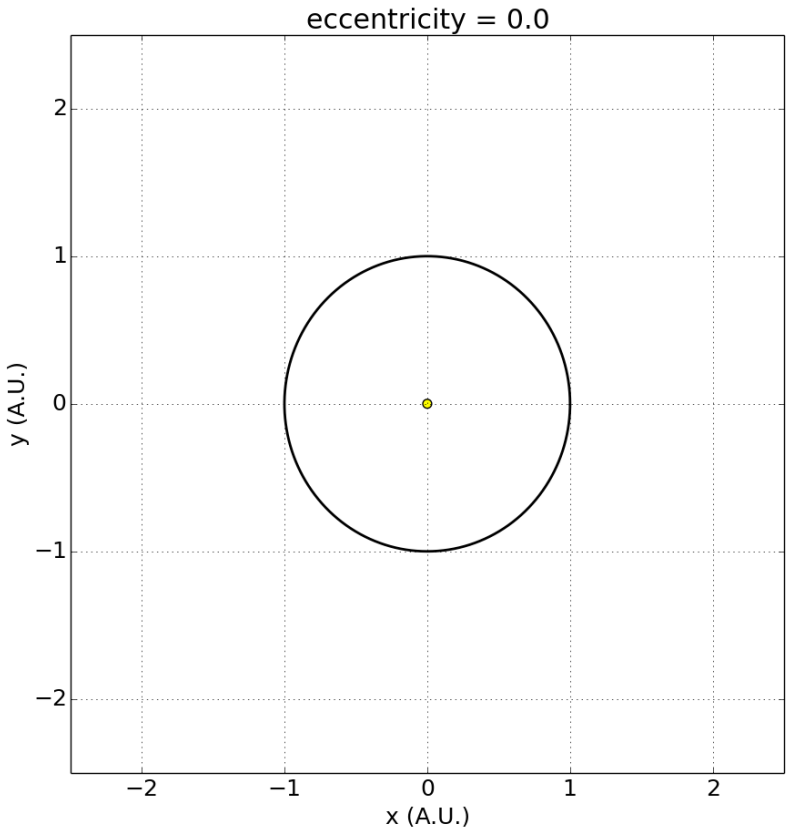
$$\epsilon = \left(1 + \frac{2EL^2}{m\alpha^2}\right)^{1/2}$$

$$\alpha \equiv GMm$$

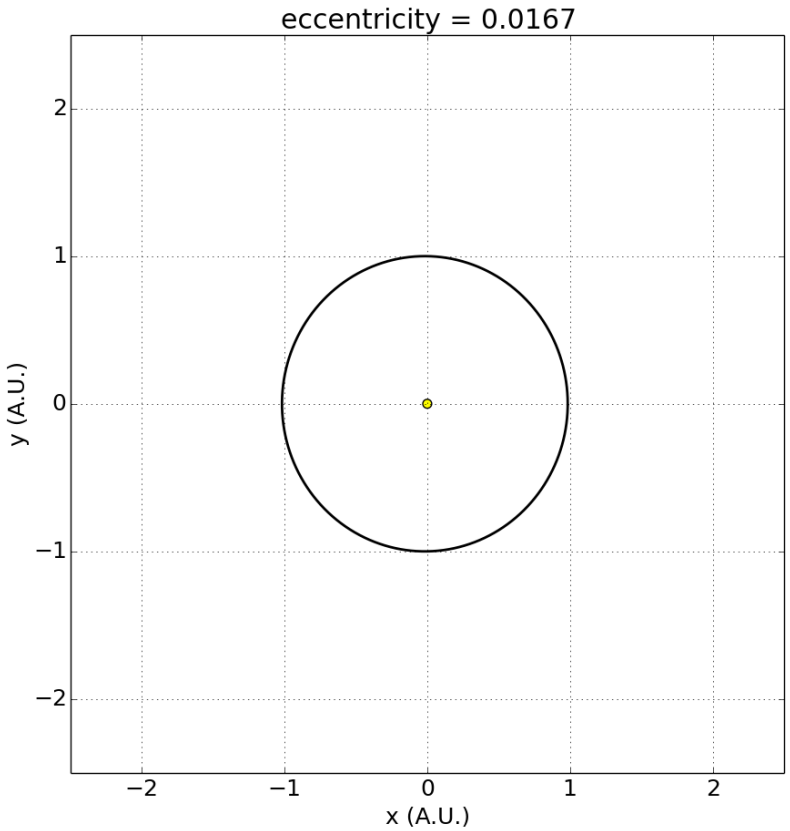
Eccentricities of Solar System bodies

Object	eccentricity
Triton	0.00002
Venus	0.0068
Neptune	0.0086
Earth	0.0167
Titan	0.0288
Uranus	0.0472
Jupiter	0.0484
Saturn	0.0541
Moon	0.0549
1 Ceres	0.0758
4 Vesta	0.0887
Mars	0.0934
10 Hygiea	0.1146
Makemake	0.1559
Haumea	0.1887
Mercury	0.2056
2 Pallas	0.2313
Pluto	0.2488
3 Juno	0.2555
324 Bamberga	0.3400
Eris	0.4407
Nereid	0.7507
Sedna	0.8549
Halley's Comet	0.9671
Comet Hale-Bopp	0.9951
Comet Ikeya-Seki	0.9999

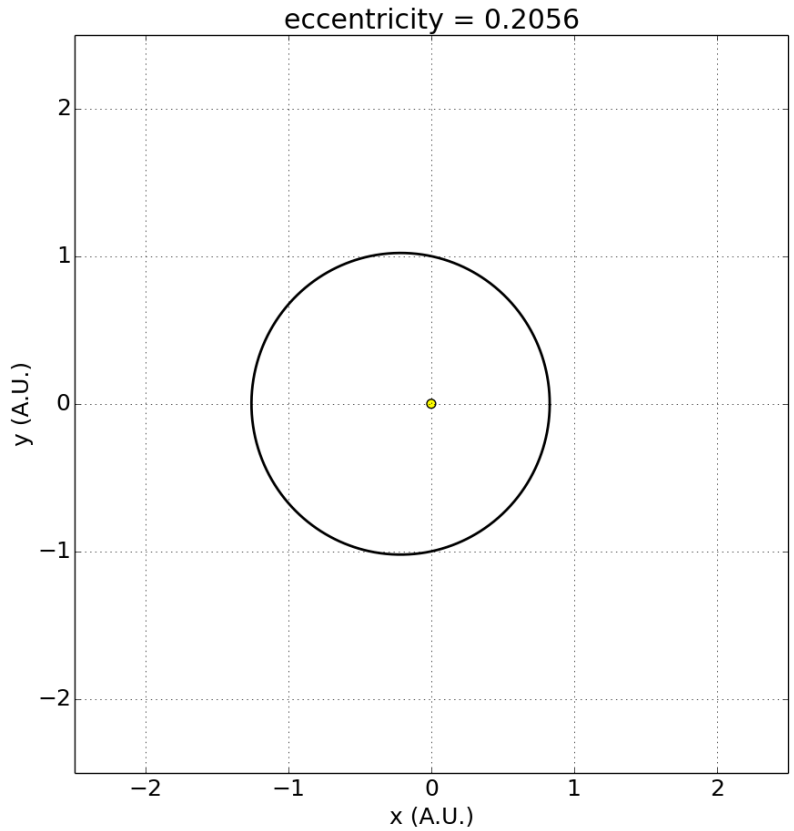
Circular Orbit



Earth's Orbit

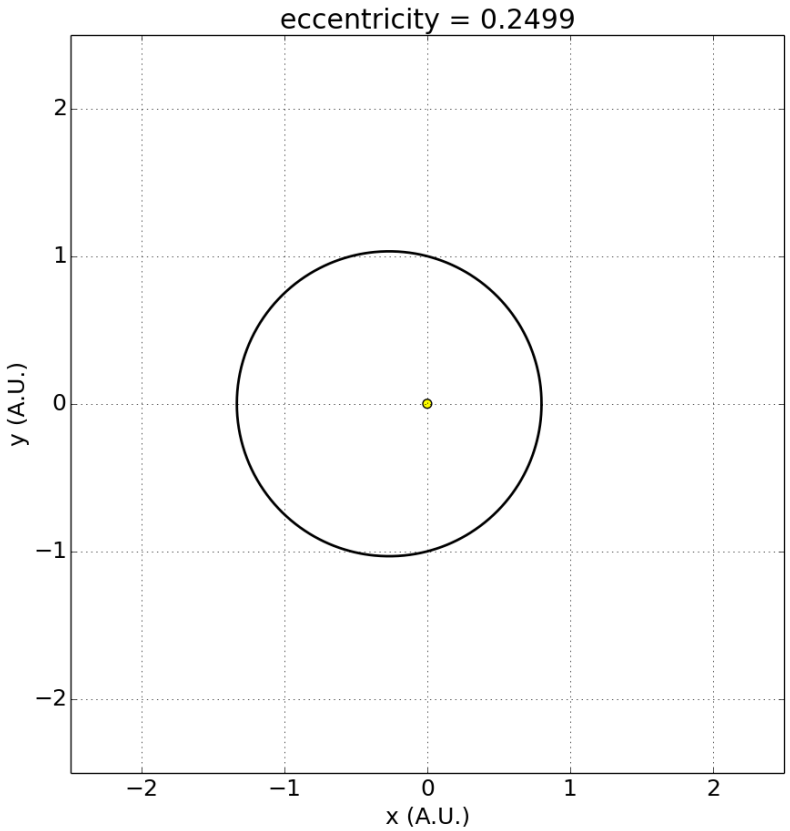


Mercury

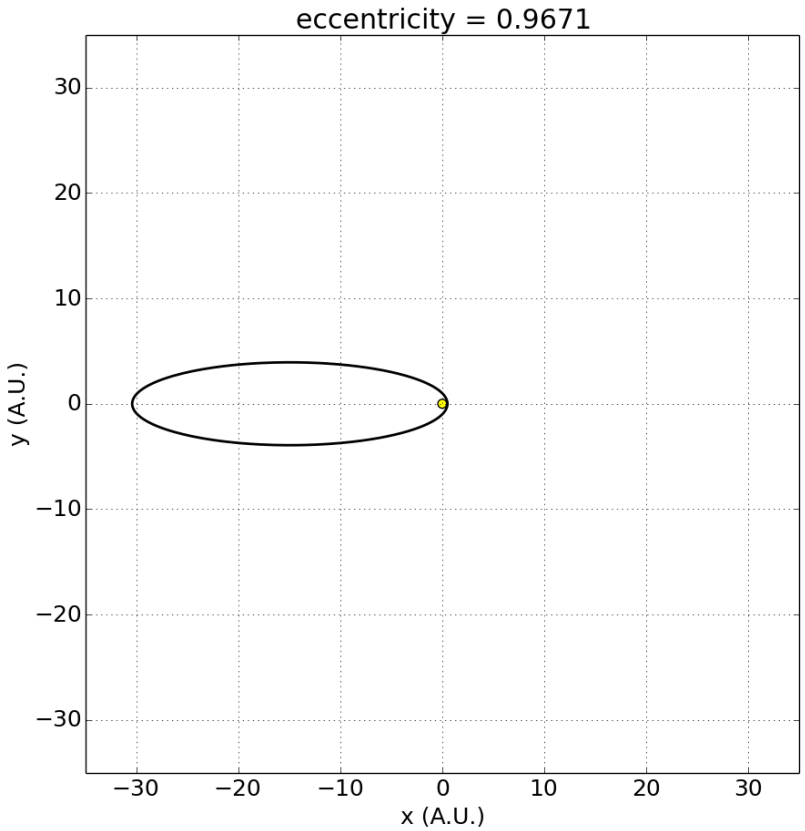


Note: actually Earthlike
r_0 with different eccentricity

Pluto



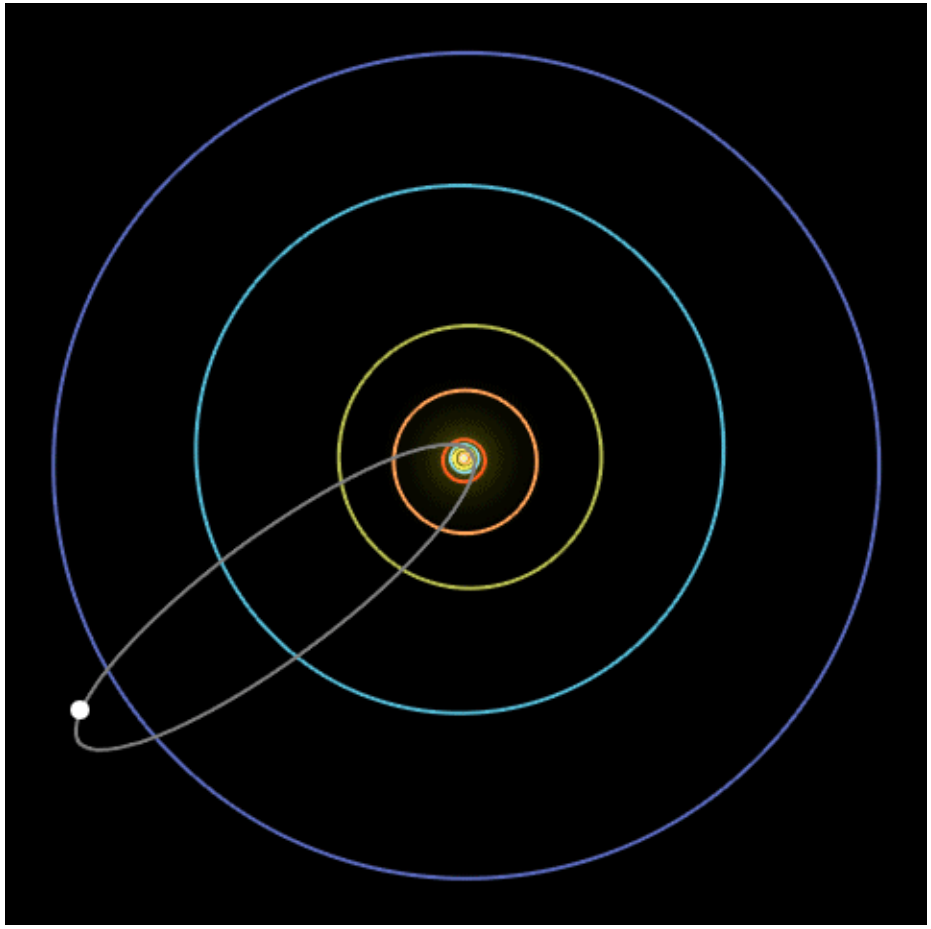
Halley's Comet



Last: 9 Feb 1986
Next: 28 July 2061

Halley’s Comet

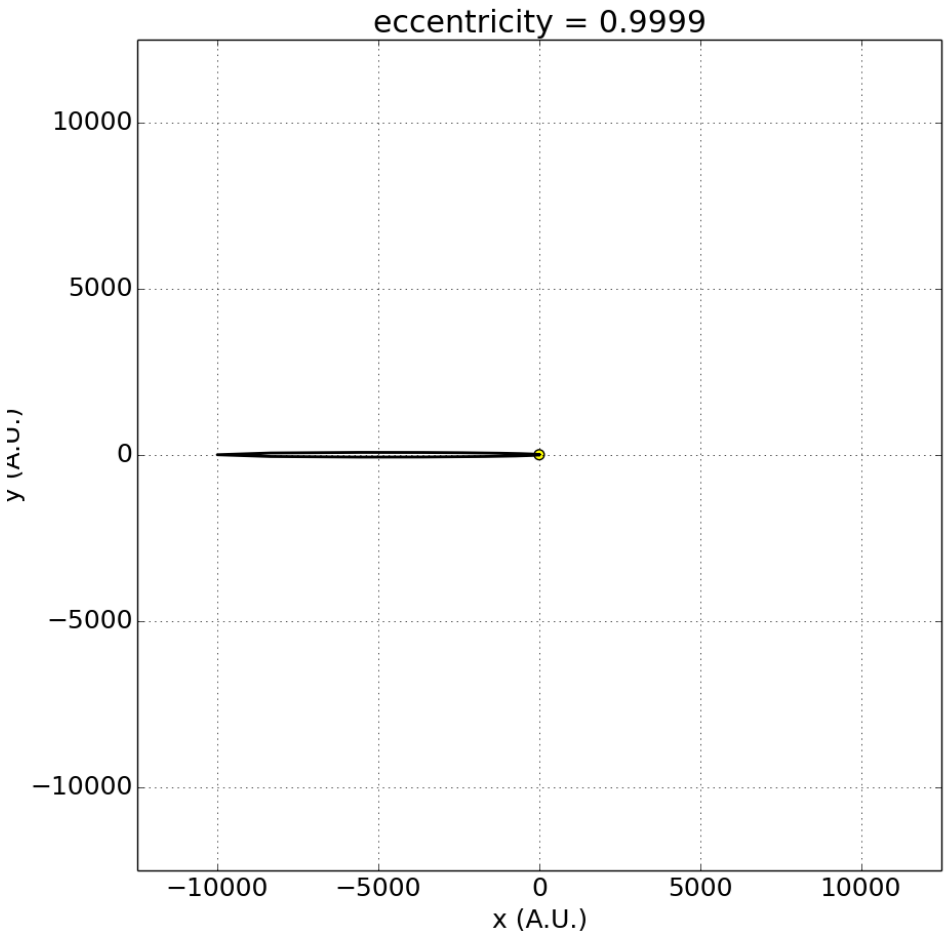
1986
Returns in 2061



Comet Hale-Bopp (1997)

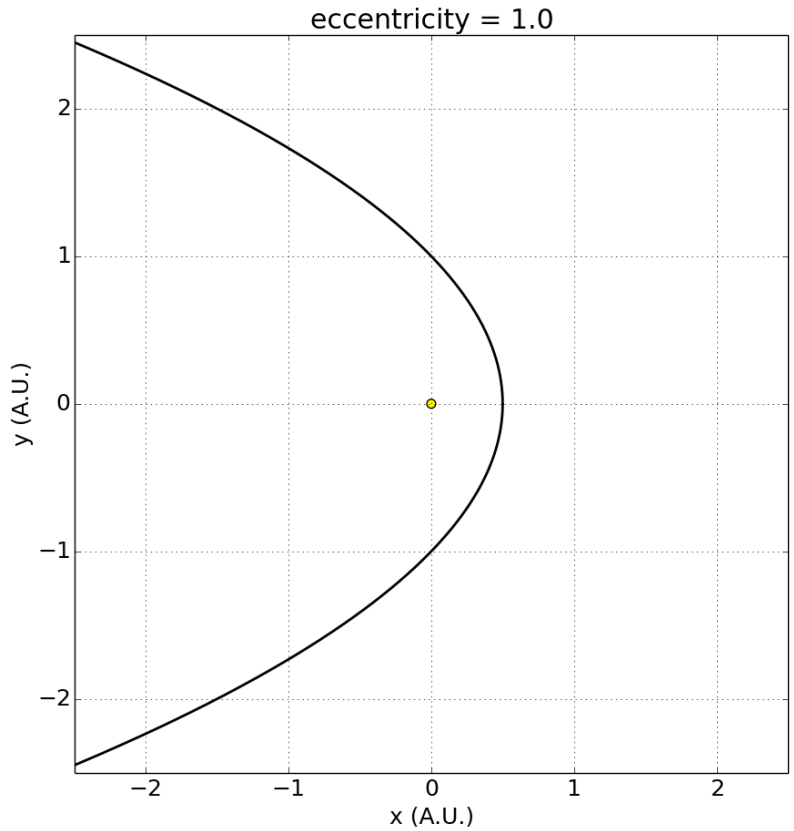
ε = 0.995
Returns in 3523!

Comet Ikeya-Seki

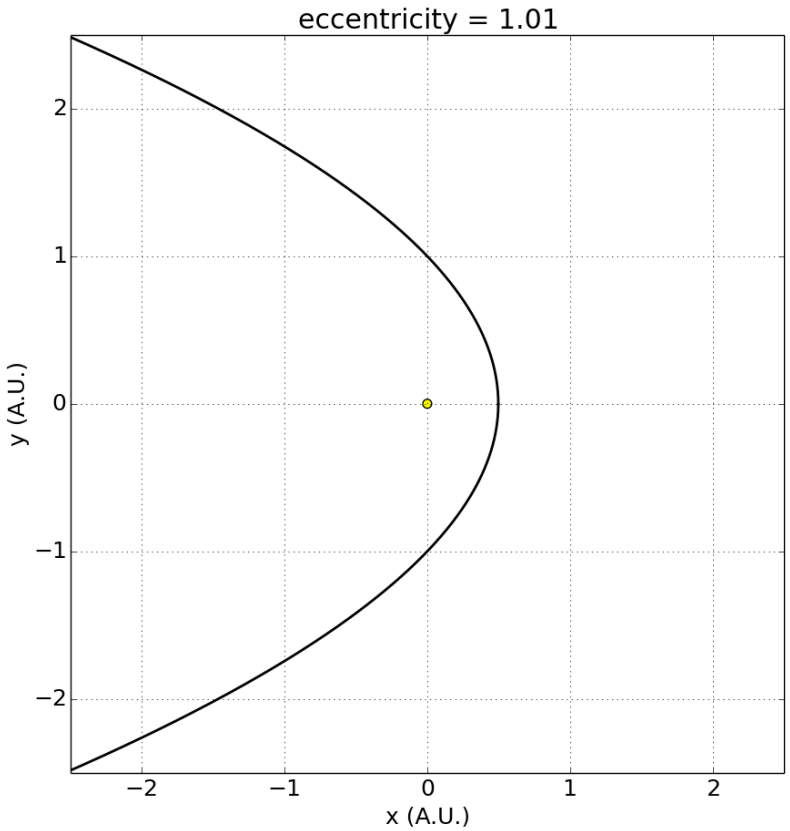


1965

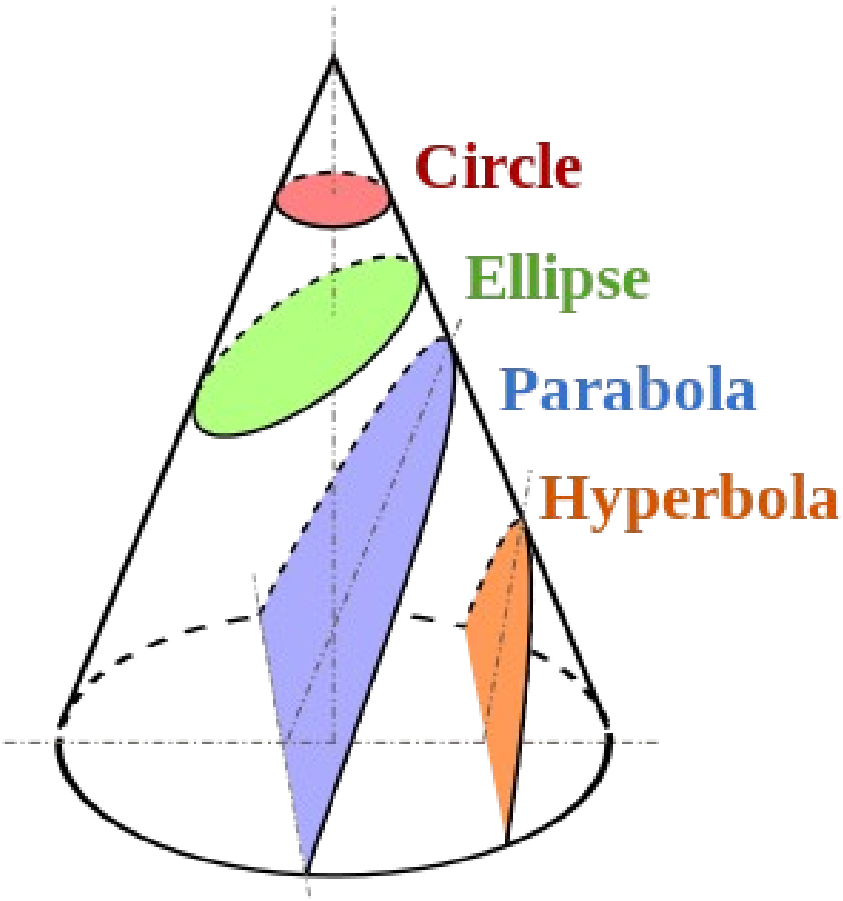
Parabolic Trajectory

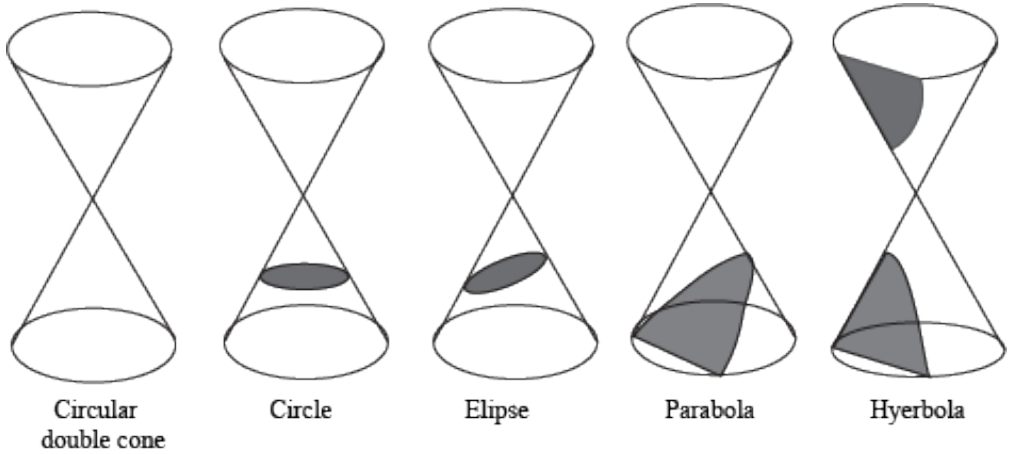


Hyperbolic trajectory



Conic Sections





Conic Sections