

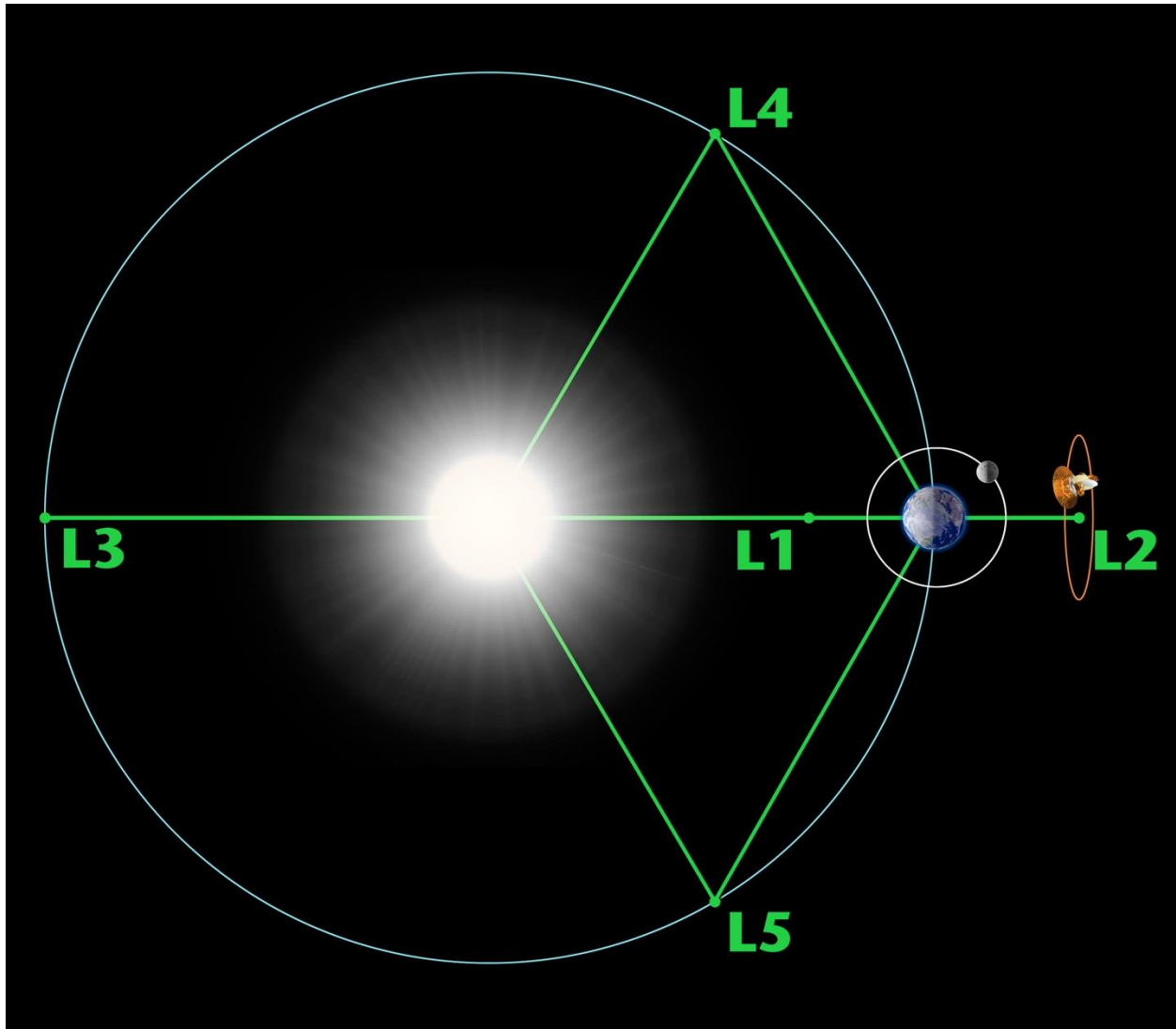
Lagrange points and why the James Webb Space telescope is at L2

<https://solarsystem.nasa.gov/resources/754/what-is-a-lagrange-point/> Excellent discussion of the basics with some history.

https://en.wikipedia.org/wiki/Lagrange_point Very complete without mathematical derivation but the final equations are presented.

Lenhard Euler 1750 Computed L1, L2 and L3

Louis Lagrange 1772 Prize winning essay on the three-body problem.
“Essai sur le Probleme des Trios Corps”
Center of mass or Barycenter. Mass ratio must be greater than 24.96



Basics: $F_{\text{centripetal}} = F_{\text{gravitational}}$ and $V_{\text{tangential}}$ produces 1year period.

L1 where SOHO solar observatory is placed.

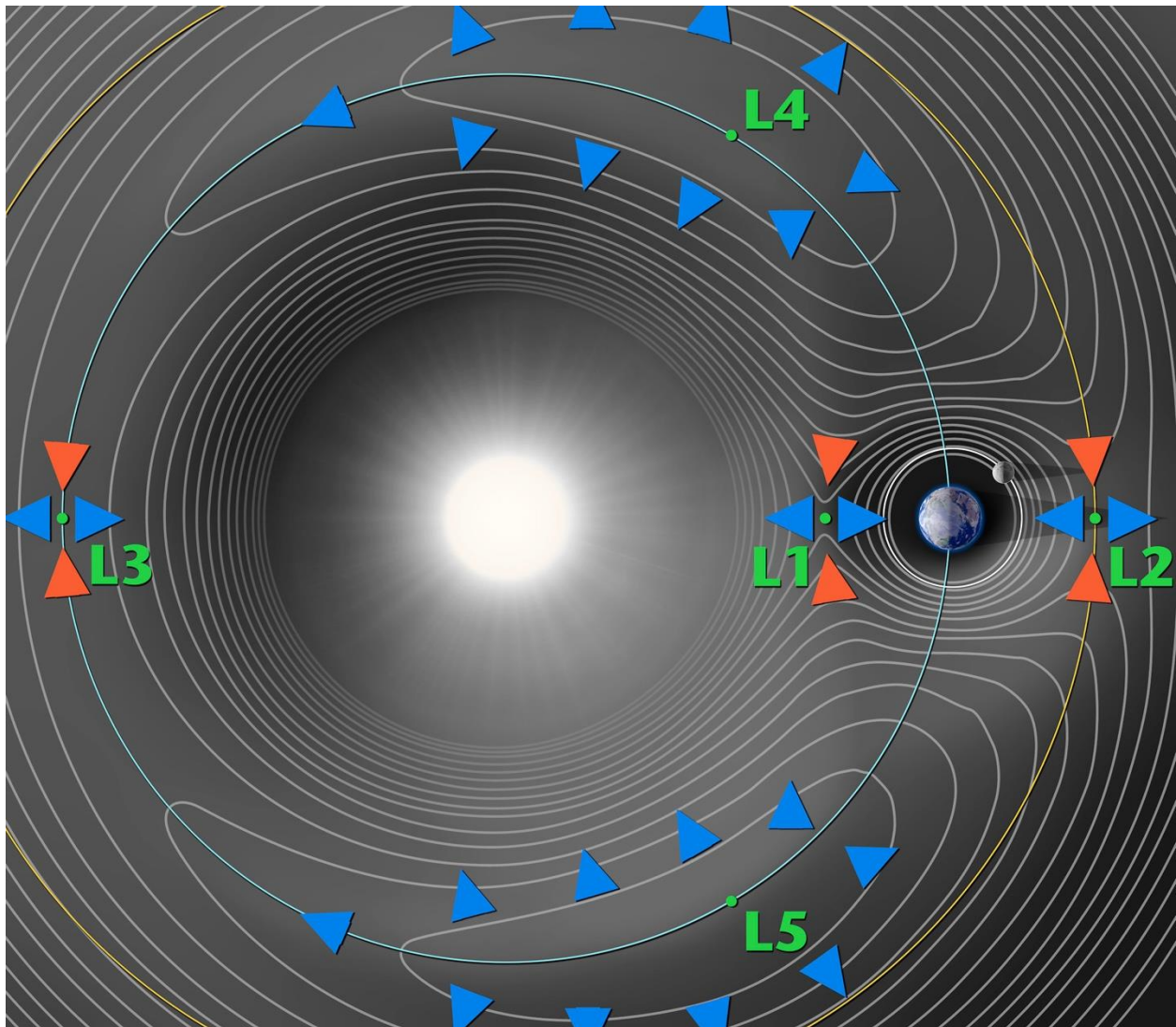
L2 Wilkinson , Plank, JWST have been placed.

L1 and L2 are not stable and require adjustment about every 28 days.

L4 and L5 are stable. Objects maintaining these positions are called Trojans.

L4 Achilles, L5 Hector. Jupiter includes a third Agamemnon.

Gravitational equipotentials help illustrate:



L1 and L2 saddles, L4 and L5 mountain peak.

Centrifugal and Coriolis discussion of factious forces stabilizing L4 and L5

L2 is not in the Earth's shadow. (Close calculation of length of umbra and L2 distance.)

Final link is by Neil J. Cornish with mathematics.