

Relationship between galactic and equatorial coordinates

The IAU System galactic latitude (b) and longitude (l) of an object may be obtained from its equatorial coordinates (α, δ) from:

$$\begin{aligned}\sin b &= \sin \delta \cdot \cos i_g - \cos \delta \cdot \sin(\alpha - \alpha_N) \cdot \sin i_g \\ \cos b \cdot \cos(l - l_0) &= \cos \delta \cdot \cos(\alpha - \alpha_N) \\ \cos b \cdot \sin(l - l_0) &= \sin \delta \cdot \sin i_g + \cos \delta \cdot \sin(\alpha - \alpha_N) \cdot \cos i_g\end{aligned}$$

Where

i_g is the inclination of the galactic plane to the celestial equator; $i_g = 62^\circ.6$ at B1950.0. (The declination of the north galactic pole equals $90^\circ - i_g$).

α_N is the right ascension of the ascending node of the galactic plane (i.e., the right ascension of the point at which the galactic plane crosses the celestial equator, heading northwards in the direction of increasing galactic longitude); $\alpha_N = 282^\circ.25$ at B1950.0. (The right ascension of the north galactic pole equals $\alpha_N - 90^\circ$).

l_0 is the galactic longitude of the ascending node of the galactic plane; $l_0 = 33^\circ.0$ at B1950.0.

The galactic latitude lies in the range $-90^\circ \leq b \leq +90^\circ$.

The galactic longitude lies in the range $0^\circ \leq l < 360^\circ$.

IAU galactic coordinates are usually distinguished from the older Ohlsson System by using superscripts I and II as follows:

$$\begin{array}{ll}(l^I, b^I) & \text{(Ohlsson System)} \\ (l^{II}, b^{II}) & \text{(IAU System)}\end{array}$$

The major distinction between the two systems lies in the zero point used to define galactic longitude: the Ohlsson System measures l^I from the ascending node of the galactic plane; the IAU System defines $l^{II} = 0$ to lie in the direction of the galactic centre as seen from the Sun. The other distinction is that the north galactic pole used in the Ohlsson System is displaced by about 89 arcminutes from that used in the IAU System.