**Note Galactic-Equatorial Coordinate Conversions**

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To convert any target's Galactic (glon, glat) coordinates to the Equatorial $(\alpha, \delta)$ frame:

$$cos(\alpha - R)\ cos(\delta) = cos(glon - G)\ cos(glat) \tag{1}$$

$$sin(\alpha - R)\ cos(\delta) = sin(glon - G)\ cos(I)\ cos(glat) - sin(I)\ sin(glat) \tag{2}$$

$$sin(\delta) = sin(glon - G)\ sin(I)\ cos(glat) + cos(I)\ sin(glat) \tag{3}$$

These three equations evaluate the components of the target direction (x,y,z) in the node frame. The constants $R, I$, and $G$ are defined in the following way, based on that node where the Galactic plane crosses the Equatorial plane with Galactic longitudes increasing towards the north equatorial pole and the right ascensions increasing towards the south Galactic pole. This node is located in Aquila, at $(\alpha = R, \delta = 0)$ and $(glon = G, glat = 0)$. The Galactic plane is inclined to the Equator with an an angle $I$:

$$R = 282.85948^\circ$$

$$I = 62.87175^\circ$$

$$G = 32.93192^\circ$$

To solve these three equations for $(\alpha, \delta)$ use arctan2() and arcsin() in degrees mode:

$$\alpha = R + arctan2(eqn2, eqn1) \tag{4}$$

$$\delta = arcsin(eqn3) \tag{5}$$

Similarly, to convert any target's Equatorial coordinates to the Galactic frame:

$$cos(glon - G)\ cos(glat) = cos(\alpha - R)\ cos(\delta) \tag{6}$$

$$sin(glon - G)\ cos(glat) = sin(\alpha - R)\ cos(I)\ cos(\delta) + sin(I)\ sin(\delta) \tag{7}$$

$$sin(glat) = -sin(\alpha - R)\ sin(I)\ cos(\delta) + cos(I)\ sin(\delta) \tag{8}$$

In this form the equations are similar to the Equatorial conversion, and the constants are the same. Since the inclination here is reversed, I have propagated the minus sign out of $sin(-I)$ onto its host term. Analogous to the previous case, the solution for the Galactic angles uses arctan2() and arcsin():

$$glon = G + arctan2(eqn7, eqn6) \tag{9}$$

$$glat = arcsin(eqn8) \tag{10}$$