Chandra X-ray Center

AHELP for CIAO 3.4

prop−coords

Context: proposaltools

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Synopsis

Defines available coordinate systems for Chandra Proposal Tools

Description

Equatorial Coordinates

Equatorial coordinates consist of a longitudinal Right Ascension (RA) and a latitudinal Declination (Dec). The plane of zero declination is the projection of the Earth's equator onto the celestial sphere, and the zero of RA is marked by the intersection of the ecliptic (Earth orbital) plane with the equatorial plane. This definition depends on epoch because of precession; its practical implementation also depends on the set of fundamental reference stars used to measure coordinates. There are two fundamental frames of reference currently in use: the FK4 and FK5 systems. The FK4 system is tied to the equatorial coordinate system for Besselian epoch B1950.0, while the more accurate FK5 system is tied to the equatorial system for Julian epoch J2000.0. The International Astronomical Union (IAU) has recommended that J2000.0 coordinates be used.

Note that since the FK4 and FK5 reference frames rotate relative to one another, the transformation from B1950 to J2000 affects not only the coordinates but the proper motions of stars. An object with zero proper motion in B1950 will have a nonzero proper motion in J2000 and vice versa. Since this program does not deal with proper motions, coordinate conversions have been adopted which assume that the object in question has zero proper motion in the J2000 system. Note further, however, that the difference between J2000 and B2000 is typically less than one arc second.

Galactic Coordinates

Defined conceptually by the Galactic plane and the Galactic center, galactic longitude l and galactic latitude b are the IAU 1958 system, formerly called lIII and bII. The system is defined in terms of B1950 equatorial coordinates as RA of (l=0) = 192.25 degrees, inclination of galactic equator to B1950 equator = 62.6 degrees, longitude of ascending node 33 degrees.

```
 Galactic l, b         B1950 RA, Dec                  J2000 RA, Dec
-------------------------------------------------------------------------
    0       0    17 42 26.58   −28 55 00.43    17 45 37.20   −28 56 10.22
    0     +90    12 49 00.00   +27 24 00.00    12 51 26.28   +27 07 41.70
```

```
 33.0       0   18 49 00.00   00 00 00.00    18 51 33.73  +00 03 38.13
123.0    +27.4   12 00.00 00  +90 00 00.00    12 01 16.85  +89 43 17.74

The J2000 north celestial pole is at l=122.932, b=27.128.
```

Supergalactic Coordinates

With the advent of large scale structure studies, the supergalactic coordinate system introduced by de Vaucouleurs is coming into more widespread use. The supergalactic equator is conceptually defined by the plane of the local (Virgo−Hydra−Centaurus) supercluster, and the origin of supergalactic longitude is at the intersection of the supergalactic and galactic planes. Supergalactic longitude and latitude, SGL and SGB, are defined by

```
 SGL,   SGB     Galactic l, b         J2000 RA, Dec
----------------------------------------------------

   0      0    137.37      0    02 49 14.43  +59 31 42.05
   0    +90     47.37   +6.32   18 55 00.98  +15 42 32.17
90.0   6.32       0     +90     12 51 26.28  +27 07 41.70
```

Ecliptic Coordinates

Ecliptic coordinates are defined by the earth's orbital plane. The B1950 north ecliptic pole is at B1950 RA 18 00 00, Dec +66 33 15. Since ecliptic coordinates are weakly epoch dependent, you can use a specific epoch to define the orbital plane other than the default B1950.0. In PRECESS and COLDEN, to select Besselian epoch Bxxxx, use the from/to option ECxxxx. Julian epochs are not provided. EC is equivalent to EC1950.

Constellations

B1950 coordinates are precessed to B1875.0 and compared with the Delporte (1935) constellation definitions.

See Also

proposaltools
        colden, dates, obsvis, pimms, precess, prop−time, prop−tools