

Re: precession of mercury

Source: <http://sci.tech-archive.net/Archive/sci.physics.relativity/2008-12/msg02121.html>

- *From:* Jerry <Cephalobus_alienus@xxxxxxxxxxxx>
 - *Date:* Tue, 23 Dec 2008 19:05:41 -0800 (PST)
-

On Dec 22, 3:50 pm, "Paul B. Andersen" <paul.b.ander...@xxxxxxxxxxxxxxxx> wrote:

Jerry wrote:

Hipparcos was designed for performing precise astrometry. Its telescope was not designed to take images.

The 1 degree square field of the telescope (actually a split screen facing two segments 58 degrees apart, but that's another story) was masked by a grid of alternating opaque and transparent bands with a period of 8.2 microns or 1.208", aligned precisely parallel to the rotational axis of the satellite. The satellite rotated slowly, about once every two hours. One object at a time would be selected for monitoring. As the object crossed the bands, it would generate a 139.7 Hz pulse train signal, and 20 minutes later it would be monitored again. The phase of this pulse train would be compared with the phase of pulse trains created by other objects crossing the telescope field. In this way, the precise angular relation between all the target objects in the area swept out by the rotating telescope could be ascertained.

```

||||||| | |
|||||||*|
|||||||
|*| |||||
|||||||
|||||||
||||||*|||
|||||||
|||||||
||*| |||||
|||||||

```

Re: precession of mercury

||||||*|

The rotational axis of Hipparcos was controlled so that it was aligned at 43 degrees with respect to the Sun and precessed 6.4 rev/year. In this way, the entire sky would be covered multiple times per year.

The highly eccentric orbit in which Hipparcos had been left by failure of the apogee boost engine necessitated more accurate monitoring of the orbit than originally planned. Nevertheless, Hipparcos exceeded its design goal of measuring its 100,000 primary target objects to 0.002". The 120,000 stars in the Hipparcos catalog are measured with median accuracy of better than 0.001".

A second photomultiplier system designed for high accuracy magnitude measurements in the B and V bands accessed the telescope image via a beam splitter. The Tycho catalog contains photometric B-V and astrometric measurements for over 1 million stars measured to 0.03", and the Tycho-2 catalog contains B-V and astrometric measurements for an additional 2.5 million stars.

Jerry

Not quite what I asked for, but an indirect answer. Since the stars were drifting past the field as the measurements were done, and the angular distance between pair of stars approx 58 degrees apart were measured, the correction for the different stellar aberration could be done when the data were analysed. The difference in stellar aberration due to the combined motions of the spacecraft around the Earth and the Earth around the Sun for two stars 58 degrees apart can be considerable.

BTW, have you seen this?

http://www.rssd.esa.int/SA/HIPPARCOS/docs/vol2_all.pdf

Thanks! It appears from the above that I made a bit of an error in my description... the two images separated by 58 degrees were not focused on a "split screen" as I stated, but were directed towards the same -focal- surface. This allowed near-simultaneous position comparisons with both nearby and distant objects, which

Re: precession of mercury

of course would provide opportunity for much increased accuracy
in the measurements.

Jerry

.