

THE RADIOSTAR α SCORPII

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In order to provide a direct connection between the radio reference frame and the fundamental optical system, based on fundamental stars, a radiostar observing programme has been started. Most of the astrolabe stations in the world are participating following the proposal of one of us (Débarbat, 1980), after Commission 24 of the IAU created a Working Group "On the Identification of Optical/Radio Astrometric Sources".

At the Valinhos Station the programme started in 1982 and the first results, including the radiostar α Scorpii (FK4 N° 616, Antares) have been published (Clauzet and al., 1985, 1986). At the latitude of the station, this star is observed far from the meridian ; consequently it is not possible to determine its declination, but the right ascension is determined in the best conditions. The mean square error for the campaign, performed at the mean epoch 1981.98, was $\pm 0.003s$.

Soon after, recent radioastrometric data for this star were published (Florkowski and al., 1985 ; Johnston and al. 1985 ; de Vegt and al., 1985). For the right ascension, and for epochs in 1982 and 1983, the errors were $\pm 0.001s$ or $\pm 0.002s$, the same order of magnitude as the Valinhos results.

The "optical-radio" comparison in right ascension suggested a photocenter effect in the case of the optical observations, the radio observations being able to separate the A and B components of α Scorpii.

Taking into account the astrophysical properties of the star (magnitude, spectral type), of the astrometric data (gravity center, orbit) and of the instrumental quantities (physical properties), it has been shown (Clauzet and al., 1986) that a correction $\alpha(A) - \alpha(\text{Photocenter})$ equal to $+ 0.028s$ must be applied to the optical results. But due to the uncertainties of the physical properties, this quantity is known with an accuracy of $\pm 0.008s$.

For the final comparison of "optical", "radio" and "catalogue" data, all results in the B 1950 system were reduced to 1983.0. They are the following :

Radio VLA	16h 26m	20.199s \pm 0.001s	A component
Optical Astrolabe		20.178s \pm 0.003s	Photocenter
		20.206s \pm 0.009s	A component
Catalogue FK4		20.191s \pm 0.004s	Gravity Center
		20.220s \pm 0.004s	A component
		20.030s \pm 0.004s	B component

The quality of the astrolabe determination is degraded for component A by the poor precision of the astrophysical data. Nevertheless, they agree very well, within the limits of the errors, with the radiodetermination of the Very Large Array (VLA of the NRAO, USA).

The quality of these radiomeasurements show that the effects of magnitude and spectral type must be taken into account in optical measurements before linking different reference frames. This correction will be needed also in the case of the Hipparcos catalogue.

In conclusion, it will be of particular importance for the linkage between "optical" and "radio" star reference systems, since most of radiostars are binary (or multiple) objects. A very careful study of all causes of uncertainties in the data for stars in the reference list should be made.

References

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