

## ALL-WAVE ASTROMETRY. BASIC PROBLEMS

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From ground based or space astronomical practical experience it is known that astrometry as well as astronomy entire can be divided, depending on the range of electromagnetic spectrum where the objects are detected, into the next seven astronomical or astrometrical subsections. They are as follows:

Gamma-ray Astrometry ( $\lambda \approx 1.2 \times 10^{-6} \div 0.12 \text{ \AA}$ )

X-ray Astrometry ( $\lambda \approx 10^{-5} \div 10^{-2} \text{ mkm}$ )

Ultraviolet Astrometry ( $\lambda \approx 0.01 \div 0.4 \text{ mkm}$ )

Visual optical Astrometry ( $\lambda \approx 0.4 \div 0.7 \text{ mkm}$ )

InfraRed Astrometry (IR) ( $\lambda \approx 0.7 \div 350 \text{ mkm}$ )

Submillimetre Astrometry ( $\lambda \approx 350 \text{ mkm} \div 1 \text{ mm}$ )

Radio Astrometry ( $\lambda \approx 1 \text{ mm} \div 30 \text{ m}$ )

Every of these directions have its specific feature connected with the concrete astronomic or astrometric task, instrumentation (telescopes, sensors, and auxiliary instruments), methods of observations and subsequent processing and, lastly, with special methods of excluding of Earth's atmospheric influences from observations if they are ground-based.

In accordance with these factors the accuracy of astrometrical observations in different electromagnetic ranges is essentially different. The ground based VLBI radio and space optical (HIPPARCOS) observations have the highest accuracy at the level of mas and the Gamma-ray flare sources localization has the lowest accuracy at the level of some arcminutes.

Now International Celestial Reference System (ICRS) is common for two of the above mentioned seven ranges: the Radio and Visual only. But in accordance with the XXII and XXIII IAU GA resolution, the ICRS coordinate system has to be extended to the five electromagnetic wavelengths ranges other then Radio and Visual optics, which is now the most pressing astrometric problem.

There are two ways to solve this problem. First one is to get on the base of the new technology a new more precise observations, as it was proposed in the new space astrometrical and astronomical projects DIVA, GAIA, SIM, RADIOASTRON, ALMA, GHST and some others.

But this way may be very long - ten or more years - before the new technology resolution of all these projects will be realized.

The other way is to use method of identification. It is more short and fast and permits to extend ICRS from Radio and Visual optics to other five spectral divisions if these ones have the objects which have optical or radio counterparts from precise astrometric catalogues that permits to locate these objects.

Now there is a more prospective situation to identify IR sources from catalogues IRAS PSC, DENIS and 2MASS with their optical counterparts from HIPPARCOS or ACT and TYCHO2 that permits to extend the ICRS to IR diapason.

The first version of such an extension has been carried out in Kiev (Kharin, Molotaj, 1999) on the base of CPIRSS (Hindsly and Harrington, 1994). Two level hierarchic IR reference coordinate system has been created. It contains two catalogues. One of them is the first level IR reference catalogue that includes only IR stars which have their optical counterparts from HIPPARCOS and consequently has to represent the ICRS coordinate system. But on our opinion the best representation can be evidently obtained if this first level IR reference catalogue includes additionally the ICRF sources that can be observed in infrared as well.

Because a search had been undertaken to find the radio sources that were observed in infrared also. Firstly the identification of the IRAS PSC stars with their radio counterparts from ISRF were carried out and 31 such sources have been found. Besides the comparison of the Neugebauer list of 179 quasars observed by IRAS satellite in 1983 with the ICRF list (C. Ma, 1998) of 608 candidates has been fulfilled and the extra 55 sources were found. Because 79 IR/Radio sources should be included to the first level IR reference catalogue, compiled in Kiev (Kharin, 2000). Such an addition permits to establish direct connection between the infrared and ICRS coordinate systems.

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