

7. THE INTERNATIONAL PROGRAMME OF ABSOLUTE PROPER MOTIONS WITH RESPECT TO EXTRAGALACTIC NEBULAE FROM ASTROGRAPHIC PLATES

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Systematic observations of galaxies in selected areas within the declination zone $+90^\circ$ to -5° were commenced with the Carte-du-Ciel astrograph at Pulkovo before World War II. The zone from -5° to -25° was studied at the Tashkent Observatory, and that from -25° to -68° at the Santiago (Chile) Observatory. Seven areas of the southern circumpolar region were photographed at the Cape Observatory.

The data on the number of areas and galaxies are given in Table I.

Table 1

Declination zones	Number of Areas	Number of Galaxies	New	Suitable for use	Type of Plates
$+90^\circ$ to -5° (Pulkovo)	157	1508	231	610	Agfa-Astro
-5° to -25° (Tashkent)	48	226	6	133	Agfa-Astro
-25° to -68° (Santiago)	94	1108	829	459	Kodak 103a-o
-68° to -90° (Cape)	7	41	13	25	Kodak IIa-o
Totals	300	3000	1000	1200	

In the first two zones the co-ordinates of the centres of the areas were finally adopted, and the estimates of the galaxies checked, by means of repeated photography. The corresponding catalogues have been published in 'Izvestia' of the Pulkovo and Tashkent observatories. The data for the rest of the regions are not as yet final; the centres of the areas and estimates of the suitability of galaxies will be determined after repeated photography.

In the totals, approximate numbers are given. One-hour exposures were used, and as a result images of galaxies to the 14-15th magnitudes and stars to the 16-17th magnitudes were obtained.

According to the Pulkovo plan, three observatories with Carte-du-Ciel astrographs participate in the observations. The data on the state of the work at these observatories are given in Table 2.

Table 2. Observations of the first epochs

The zone $+90^\circ$ to -5°		
<i>Pulkovo</i>	<i>Tashkent</i>	<i>Toulouse</i>
Entirely completed.	Considerably advanced.	Commenced.
The zone -5° to -25°		
	<i>Tashkent</i>	<i>San Fernando</i>
	Considerably advanced.	Commenced.
The zone -25° to -90°		
<i>Santiago</i>	<i>Perth</i>	<i>Cordoba</i>
Advanced.	Commenced.	Intended.

It will also probably be necessary to ask the Cape Observatory to repeat the photographs of the areas of the southern circumpolar region after a final adoption of their centres.

In addition to Carte-du-Ciel instruments, astrographs with a longer focal length in Moscow, Kiev, Bucharest and Shanghai (Zô-Sè) and also with a wide-angle camera (focal length 2.3m, focal-ratio 1/10, field 36 square degrees) in Moscow were used for photographing the galaxies. The observations with these instruments are considerably advanced, but the number of galaxies suitable for observation and the number of areas is naturally smaller. At the other observatories the estimates of galaxies in the adopted system of units are lower by unity than at Pulkovo. The estimates made for the Moscow wide-angle astrograph are lower by 0.5 units as compared with the Pulkovo Carte-du-Ciel astrograph. Nevertheless, with the addition of these observations it can be considered that the zone $+90^\circ$ to -25° is well provided for.

However, it is desirable that one more southern observatory with a Carte-du-Ciel astrograph participate in observations in the zone -5° to -25° . According to our plan the main task of astrographs of longer focal length is to photograph the fundamental KSZ stars for the reference of the KSZ catalogue to galaxies using background stars of the 13-14th magnitudes. The list of 240 fundamental stars in the zone $+90^\circ$ to -5° and 71 stars for the zone -5° to -25° has been completed and published. The observations of these stars have either been completed or are nearing completion. The stars are selected so that they are located close to the centres of the areas with galaxies and also fill up the "zone of avoidance" with about the same density, so as to make possible the connection of the galactic belt with regions where absolute proper motions are obtained by reference to galaxies. The astrographs in Bucharest and especially in Shanghai (the latitude $+31^\circ$ permitting photography to -35°) are of great value in this respect.

The list of the FKSZ stars in the zone -25° to -90° will be compiled as soon as the final co-ordinates of the centres of the areas with galaxies are adopted. I should like to request that observatories with Carte-du-Ciel astrographs and astrographs of long focal-length participate in the photography of areas with fundamental stars. It is necessary to take two plates of each area with an exposure of 20 minutes. An objective grating which gives diffraction companions fainter by four magnitudes than the central image, is required. At present it is possible to commence observations in the zone -5° to -25° , as so far only the Shanghai Observatory can photograph this zone completely.

8. THE LICK PROGRAM OF ABSOLUTE PROPER MOTIONS

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The determination of stellar proper motions with reference to galaxies was proposed by Wright (1, 2, 3, 4). The first-epoch plates were taken with the 20-inch Carnegie Astrograph by C. D. Shane and C. A. Wirtanen between 1947 and 1954. There are 1246 fields north of declination -23° ; each $6^\circ \times 6^\circ$ field is covered by a 17-inch square plate. Plates are centered 5° apart in declination and 5° or less in right ascension. An additional series of photographs down to -33° has been taken for counts of galaxies; these plates may also be considered for proper-motion purposes. Two exposures, of lengths two hours and one minute, through a coarse diffraction grating have been used for reference of bright stars to the frame of faint galaxies.