

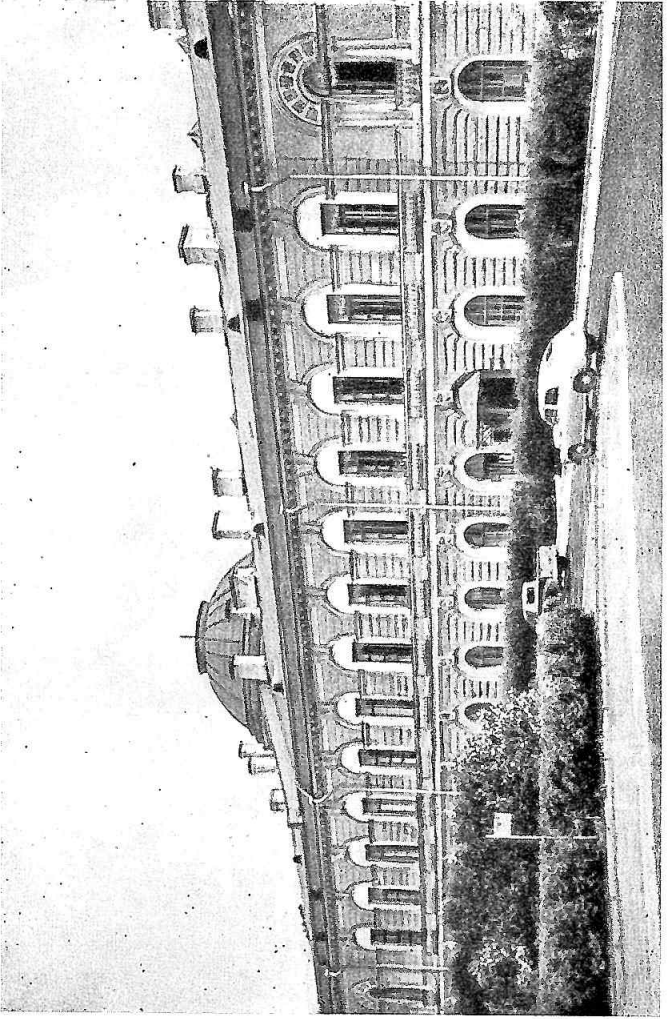
ACADEMY OF SCIENCES OF THE
USSR

M. F. SUBBOTIN

**INSTITUTE
FOR THEORETICAL
ASTRONOMY**



ACADEMY OF SCIENCES OF THE USSR PRESS



ACADEMY OF SCIENCES OF THE USSR

M. F. SUBBOTIN

**INSTITUTE
FOR THEORETICAL
ASTRONOMY**

ACADEMY OF SCIENCES OF THE USSR PRESS

Moscow — 1958 — Leningrad

Chief editor
Prof. J. D. ZHONGOLOVICH

The Institute for Theoretical Astronomy occupies a special position among the astronomical institutions of the USSR because of the character of its work. It belongs to those very few astronomical institutions in the world in which theoretical and computational work on the motion of cosmic bodies is concentrated. This work forms the basis of astronomy and deals with the following.

1) The elaboration of general mathematical theories of motion, founded on the law of gravitation, these being the subject of celestial mechanics.

2) The development, on the basis of these general theories, of special theories of motion of celestial bodies: planets, satellites and comets.

3) The comparison of such specific theories with observations made at astronomical observatories and the evaluation by this means of the masses of celestial bodies, the elements of their orbits and other constants, characterizing the mechanical properties and motion of these bodies.

4) The computation of various ephemerides, which give the future position of celestial bodies necessary for astronomers, geodesists, hydrographers and sea and air navigators.

Thus one of the main tasks of the Institute for Theoretical Astronomy is the provision of our country with basic astronomical data indispensable to all branches of national economy connected with geodetical problems and also sea transport and aviation.

We shall first consider that part of the work of the Institute which is more widely known, that which is connected with meeting practical requirements.

Here, first of all, the compilation of such fundamental publications as the Astronomical Almanac of the USSR, the Nautical Almanac and the Aviation Astronomical Almanac should be mentioned.

The Astronomical Almanac of the USSR, published by the Institute, along with analogous publications in England, France and the USA, is at present one of the great astronomical almanacs on which the main astronomical works in the whole world are based. Other countries either use one of these almanacs or compile their own with less detail by means of one of them.

The Nautical Astronomical Almanac is of great practical importance and indispensable to every ship, while the Aviation Astronomical Almanac provides for the determination of the position of aircraft.

Besides these main publications, the Institute compiles and publishes various tables, nomograms and special ephemerides for the solution of different practical and scientific problems. So, for example, the Institute compiled special tables of the altitudes and azimuths of the Sun, Moon, planets and stars for all latitudes, from the North to the South Poles, for air navigation. In 1956 the Institute provided the Antarctic expedition of the Academy of Sciences of the USSR with special ephemerides

for determining geographic coordinates near the South Pole. Another example is a new method worked out at the Institute for the reduction of observations made for deriving the longitude of astronomical-geodetical points by Zinger's method. The special ephemerides needed for this were also calculated at the Institute. After the compilation of special auxiliary tables these calculations were transferred to the Central Scientific Research Institute of Geodesy, Air-Survey and Cartography for practical use.

The task entrusted to the Institute of providing the necessary data for the determination of astronomical coordinates on land and sea and in the air requires the elaboration of new scientific methods to meet new problems and higher demands. Therefore the almanacs compiled at the Institute are constantly being improved. Essential improvements were made in the 1945, 1955 and especially the 1960 editions of the Astronomical Almanac of the USSR. In 1944—1946 the Institute worked out a new form of the Nautical Astronomical Almanac. The ephemerides compiled according to this new form for the summer months of 1946 and 1947 were tested in practical navigation. As they were found to be very efficient, the new form of the Nautical Astronomical Almanac has been adopted since 1948.

When speaking about the practical significance of theoretical astronomy it is necessary to mention its fundamental importance for natural sciences. Only a detailed study of the motions of celestial bodies gives a possibility for establishing an inertial coordinate system. Geodetical and astrometrical investigations with the help of Astronomical Almanacs fix the space coordinate system first on the Earth and then in cosmic space. The Time Service also uses the ephemerides for determining Universal Time,