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**METHODS AND INSTRUMENTS
IN ASTRONOMY: FROM GALILEO
TELESCOPES TO SPACE PROJECTS**

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ABSTRACT BOOK

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AUTOMATION OF TELESCOPE TIME SCHEDULING

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A software for efficient scheduling of observations of asteroids at a given time moment has been developed to optimize the observational process at the telescope AZT-8 (Evpatoria) operating in automatic mode.

The schedule of observations is calculated with the specific conditions of visibility of objects for the given telescope. The next conditions which correspond to astrometric observations of asteroids have been chosen to constrain scheduling at the given time moment:

- 1) observations of objects should be made as close as possible to the meridian;
- 2) observations should be made for the maximum number of objects.

The software uses technical characteristics of the telescope and camera, ephemerides, calculated with the HORIZONS system, and a given SNR for each object for scheduling of observations. The theoretical extinction value, phase and position of the Moon relatively to the observational objects and horizon are also used for the calculation of exposure time. The algorithm schedules observations of photometric calibration fields. The result of algorithm depends on a ratio number of the objects planned for observation to the maximum number of objects which can be observed at night, i.e. the algorithm will provide changes to the list of objects in dependence of the previous run (it is necessary to avoid a situation, when the algorithm systematically skips a certain class of objects all the time).

HOW MANY SATELLITES ARE DISCOVERED IN THE SOLAR SYSTEM AFTER GALILEO

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The Moon as a natural satellite of the Earth was “discovered” by Nicolaus Copernicus in his heliocentric system and it was the only known satellite in the Solar System before Galileo Galilei (1564-1642).

Early in 1610 Galileo discovered four satellites orbiting Jupiter, that are satellites of another planet than the Earth. They are well known as Galilean moons (or satellites) Io, Europa, Ganymede and Callisto. It was not until 45 years later that the next satellite in the Solar System was discovered (13 years after Galileo's death). It was the biggest Saturn's moon Titan, discovered by Christian Huygens. After that the discoveries of satellites happened more frequently and by the end of the 17th century the total number of discovered moons was ten.

From 1684 till 1787 (more than one century!) no satellites were discovered and the next 18th century added only four satellites (two of Saturn and two of Uranus). They were discovered by William Herschel, the most famous astronomer of 18th century (1738-1822), who also discovered the 7th planet Uranus in 1781. It should be stressed that during that century there were no more discoveries of either planets or satellites. Thus, we can conclude that while G. Galilei was the greatest discoverer of the 17th century, W. Herschel was the greatest discoverer of the 18th century.

In the 19th century the 8th planet Neptune and its moon Triton, two Uranus' and two Saturn's moons, one of Jupiter and both of Mars' moons (Phobos and Deimos) were discovered. However, the next 20th century and the beginning of 21st one turned out to be much more abundant in satellite discoveries due to both ground-based observations and space missions (Voyager-1, Voyager-2, Cassini-Huygens, Galileo). In 1992 the first satellite (Dactyl) orbiting main-belt asteroid 243 Ida was discovered by space mission "Galileo". It was the beginning of abundant discoveries of asteroid satellites by photometric and radar observations and then of satellites of Kuiper-belt and transneptunian objects.

By the beginning of 2010 the total number of natural satellites in the Solar System was equal to 350, including 168 satellites of large planets, 119 multiple asteroids (including main-belt and near-Earth asteroids, Mars-crossers and Jupiter Trojan asteroids) and 63 multiple transneptunian and Kuiper-belt objects. Meanwhile, we cannot count precisely how many moons in total are discovered to date due to the deficiency of accepted definitions.