MATERIAL OF THE COMET HALLEY NUCLEUS CAN BE STUDIED AS EARLY AS 2019. A. P. Vidmachenko[1,2] and A. F. Steklov[1,3], [1]Main Astronomical Observatory of National Academy of Sciences of Ukraine, Str. Ak. Zabolotnogo, 27, Kyiv, 03143, [2]National University of Life and Environmental Sciences of Ukraine, St. Heroyiv Oborony, 12, Kyiv, 03041, [3]Interregional Academy of Personnel Management, Str. Frometivska, 2, Kyiv, 03039, avidmachenko@gmail.com.

The Solar System was beginning to form from a protosolar gas-dust cloud. Asteroids and cometary nuclei also consist of this primary substance. Therefore, the secret of the origin of the Solar System is stored inside the cometary nuclei and asteroids. Studying of meteoroids particles can help answer many questions about the origin of the Universe. In the meantime, we study the composition for those asteroids and cometary nuclei, the fragments of which fell to Earth by meteoritic material [2, 3, 12, 16, 17]. But let's remember that on the surface of our planet daily falls from 100 to 1000 tons (under the action of meteor showers) of meteoric matter [1, 10]. Most meteor showers recur annually, and they last from several days to months [5]. Most meteor showers recur annually, and they last from several days to months [5]. The "parents" of these meteoroids are the remnants of known cometary nuclei, and for 5-7 known asteroids [4]. For example, the meteoroids for the η-Aquaria meteor shower in April-May are the remains of the nucleus of Comet Halley [18]. The second time the Earth crosses the orbit of a swarm of particles from the same comet in October, Orionid meteor shower is caused. Therefore, samples of the nucleus of Comet Halley can be taken in outer space.

Recall that to study the nucleus of the comet Churyumov-Gerasimenko, a special device was sent to it. The cost of this space experiment was almost 1 billion euros. After 2021, NASA experts are planning to catch an asteroid using a special unmanned probe, then deliver it to the Moon's orbit, where the asteroid samples will be collected in special containers, and then they will be sent to Earth for their detailed analysis and study.

But to study the material of a specific cometary nucleus (or asteroid), we suggest not to "catch" an entire asteroid or cometary nucleus at great distances, but to take samples, for example, of the same nucleus of Halley's Comet in outer space directly in orbit around the Earth. After all, to study it is enough for us to have only a speck of dust or a small meteoroid. That is what we propose to catch in open space, carefully preserve and then deliver for thorough research in terrestrial conditions with the help of modern high-quality equipment [24, 25].

As a device for "catching" meteoritic substances in outer space we can use, for example, special traps that were used at the "Stardust" interplanetary station, which was intended to study comet 81P/Wild and to collect particles from its tail [14]. There, 132 cells of the return capsule were filled with silica-based airgel. This substance is characterized by ultra-low density. Therefore, it is able to slow down particles flying at high speed, without overheating them. It is these characteristics that prevent the destruction of even organic and other molecules if they are on these particles [6–9, 11, 13, 15, 19-23]. Satellite systems and rockets should be equipped with such cells. They need to open at moments close to the maximum of selected meteor showers. Under such conditions, micrometeorites delivered from space will not be exposed to high temperatures.

In our opinion, several hundred of such airgel cells are most appropriate to be delivered to the International Space Station, and then at the moments of the meteor shower maxima place them for several days on special rods on the outer surface of the ISS. After which such airgel cells should be mothballed and returned to Earth for a thorough investigation. And ensuring complete sterility for this substance is likely to bring us valuable information, including on "extraterrestrial" life. After all, such an interplanetary substance is a grateful material for a wide variety of astrobiological research.

And at the same time, it will not be necessary to fly away for millions of kilometers, or to expect dozens of years to study a substance, for example, the nucleus of Comet Halley. Indeed, for this purpose every year in April-May and in October, it is possible to "catch" substance from the nucleus of this comet. That is exactly at the time when the Earth moving in its orbit meets the cometary substance during the action of the corresponding meteor showers.

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