

Evaluation 1:

The average number of research staff in the discipline of "Astronomy" employed at the Nicolaus Copernicus Astronomical Center of the Polish Academy of Sciences is 60.18. 4 projects are funded by the European Research Council, and another 4 projects involving scientific research are funded in a competitive mode by foreign institutions or international organizations.

The total number of scientific articles included in the evaluation is 218, of which 40 articles are scored at 200 points and 124 articles have 140 points.

Thus, it can be concluded that most of the work is published in top-ranked journals, and the number of grants is quite high.

The total number of citations of scientific articles included in the evaluation is 8628, the corresponding Hirsh index is equal to 31, the average number of citations is 40 per article. The most cited article has 1850 citations, and the top ten articles have well over 100 citations each.

So, taking into account the number of citations and the "impact factor" of the journals in which the articles were published, presented in the first evaluation criterion, one can undoubtedly conclude that CAMK's scientific achievements have a significant international impact on the development of the discipline

"Astronomy," as well as on the development of civilization.

In order to compare the quality and effects of CAMK's activities with the quality and effects of scientific activities carried out within the discipline by leading European scientific centers with similar scientific potential, I chose the "Max-Planck-Institut für Astronomie" (MPIA) in Heidelberg-Königstuhl. The level of this institution is evidenced by the fact that MPIA is ranked at the top of the Max Planck Society's ranking of institutes (<https://research.webometrics.info/en/MPG>). MPIA has more than 200 researchers and more than 60 PhD students. Thus, it is larger than CAMK, which will have to be taken into account when comparing scientific achievements. For the analysis of scientific achievements, I have selected the full publication lists of CAMK and MPIA from the last 5 years. The analysis shows that the total number of publications with MPIA affiliation is 2,439, the total number of citations is 53,738, the corresponding Hirsh index is 75, and the average number of citations is 22.06. For CAMK, the total number of publications with CAMK affiliation is 1,113, the total number of citations is 37,031, the corresponding Hirsh index is 69, and the average number of citations is 33.27. It can be seen that the achievements of the two institutions, given the difference in the number of employees, are comparable, and the average number of citations of CAMK is higher. Moreover, comparing the list of publications of the two institutions ordered by the number of citations (starting with the highest cited), it turned out that the two highest cited works are the same, but further on the number of citations of CAMK's works is slightly higher, up to position 37. Summarizing the above comparisons, I can conclude that the Nicolaus Copernicus Astronomical Center of the Polish Academy of Sciences meets all the conditions needed to obtain the A+ category.

Evaluation 2:

This entity provides extremely important and significant scientific results on a wide range of astronomical, astrophysical and astro-particle topics at a very high international level.

The publication record with articles in international refereed journals is very remarkable in number and of very high quality. Many of these publications are very highly cited. The science produced and published at this entity is world-wide highly recognized and appreciated. Scientists at the entity are involved, often in leading positions, at some of the most exciting research fields in astrophysics and astroparticle physics, to name just a few: research on black holes of various mass ranges (stellar mass, intermediate mass, supermassive), including gravitational wave studies (and detections with VIRGO) of binary black hole mergers; stellar variability in general, i.e. Cepheids, and asteroseismology in particular (with the TESS mission); cosmology with quasars and distance determinations (e. g. araucaria); high and highest energy astrophysics (e. g. with H.E.S.S.), dark matter experiments and searches.

The entity is involved in a remarkably large number of high and highest quality international projects, often partly or fully funded by foreign or European sources. In particular the four ERC projects stand out: ERC grants are immensely prestigious and competitive, this success shows that the entity plays in the champions league of science. The list of projects is very impressive, to highlight just a few of these highly exciting projects: the "Sub-percent calibration of the extragalactic distance scale in the era of big surveys", the "Particle Astrophysics Science and Technology Centre", "Novel technologies for dark matter search and frontier astroparticle physics experiments" or "Precise measurement of the Hubble constant in the Gaia era".

The entity has a broad and significant societal impact as well. As a "by-product" of the original scientific goals, the SOLARIS robotic telescopes monitor and track space debris in cooperation with the Polish space agency POLSA and with spin-off start-up companies, all within a European network. This is an extraordinarily important societal task because space debris is potentially a significant threat to satellites and even humans in space stations. A second example for the effects on society is the implementation of scientific space missions and hence the development of the space industry in Poland. Based on the entity's experience with scientific space missions, POLSA commissioned scientists to carry out a feasibility study for a genuinely Polish space mission; furthermore, the entity is the only scientific institution included in the Polish delegation to ESA which also reflects the top expertise.