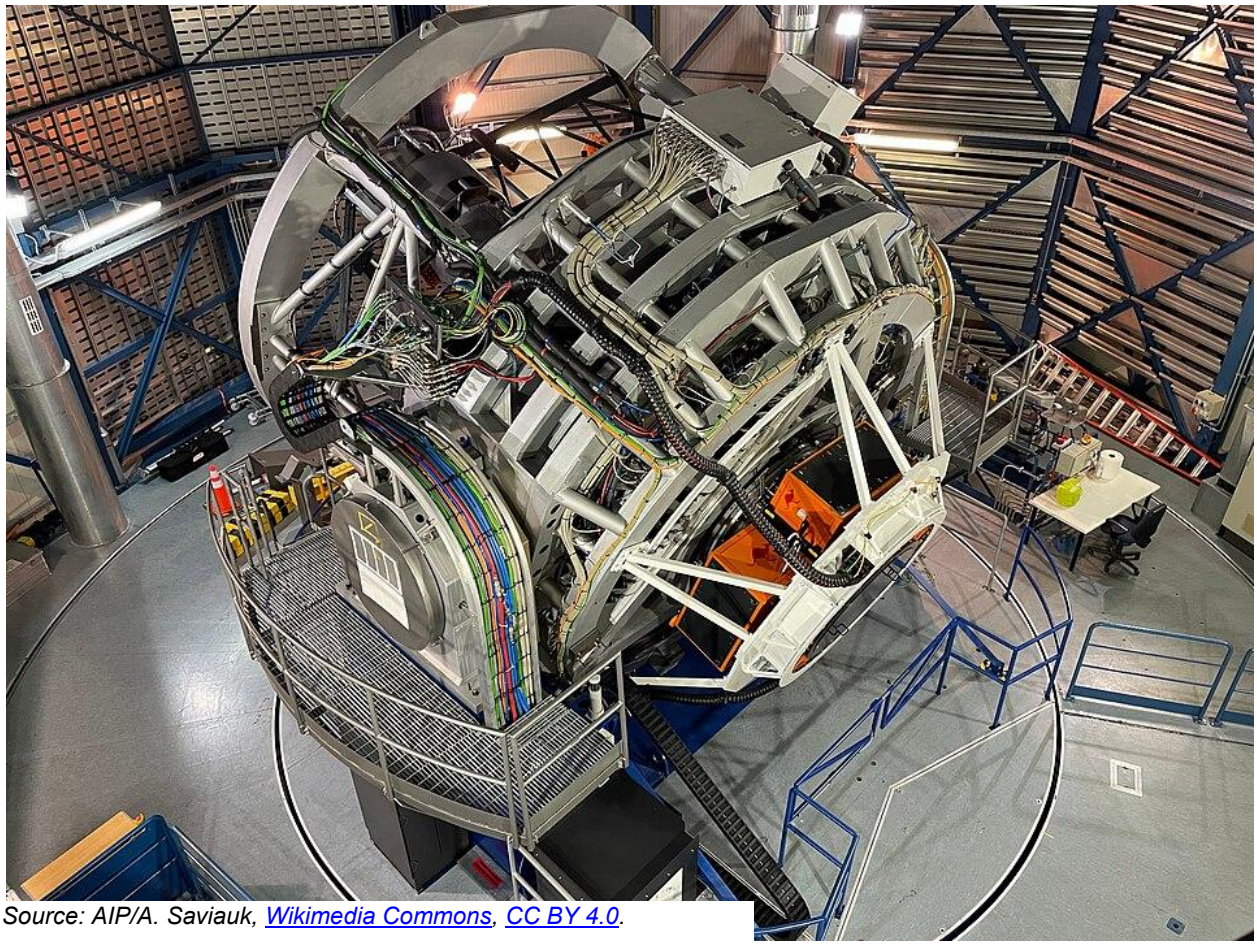
Warsaw, 16 November 2026 PRESS RELEASE

CTP PAS expands its role in mapping the Universe thanks to the Polish 4MOST Consortium

Researchers from the Center for Theoretical Physics of the Polish Academy of Sciences (CTP PAS) are expanding their participation in the international 4MOST project, one of the world's most ambitious astronomical spectroscopic surveys. This is possible thanks to the establishment of the Polish 4MOST Consortium (Pol4MOST). The consortium is led by the Nicolaus Copernicus University in Toruń and includes CTP PAS, the Nicolaus Copernicus Astronomical Center of the Polish Academy of Sciences, and the National Centre for Nuclear Research. It has been awarded a grant of PLN 1.86 million by the Polish Ministry of Science and Higher Education to support Polish involvement in 4MOST.



Source: AIP/A. Saviauk, Wikimedia Commons, CC BY 4.0.

The 4-metre Multi-Object Spectroscopic Telescope (4MOST) is a powerful instrument, upgrading the VISTA telescope at the Paranal Observatory (part of the European Southern Observatory) in Chile. Using 2436 optical fibres, it can collect light from thousands of astronomical objects simultaneously and split it into spectra of different wavelengths. These spectra reveal important properties of stars and galaxies, including their chemical composition and motion. For distant galaxies, measuring how much their light has been shifted towards longer wavelengths by the expansion of the Universe, a phenomenon known as *redshift*, allows astronomers to estimate their distances and reconstruct three-dimensional maps of the cosmic distribution of galaxies. Over its five years of observations, 4MOST will collect spectra of millions of stars in our Galaxy and millions of distant galaxies, helping astronomers investigate how the Universe formed and evolved.

CTP PAS researchers have been involved in 4MOST since well before the establishment of Pol4MOST. Professors Wojciech Hellwing and Maciej Bilicki contributed to the scientific development of the 4MOST Hemisphere Survey (4HS), one of the project's major extragalactic surveys, and continue to participate in its scientific coordination. Since 2023, Prof. Hellwing has been co-leading the 4HS cosmological simulations working group. Prof. Bilicki is also involved in the 4MOST Wide Area Vista Extragalactic Survey (WAVES), contributing in particular to its target selection, via a machine-learning based approach led by CTP PAS PhD student Gursharanjit Kaur. He has also taken up the role of the 4MOST Science Policy Board chair since 2025.

At CTP PAS, the main scientific focus in 4MOST data exploitation will be cosmology, the study of the Universe on its largest scales. The team led by Professors Bilicki and Hellwing will investigate how the cosmic web of galaxies, clusters, filaments and voids has evolved over billions of years, how galaxies form within these structures, and how matter flows under the influence of gravity. Combining 4MOST observations with other astronomical surveys and advanced cosmological simulations will allow researchers to compare the observed distribution and motions of galaxies with theoretical predictions. Such comparisons will provide powerful tests of our current cosmological model and help constrain the properties of dark matter, dark energy, and potentially the nature of gravity itself.

With its unprecedented spectroscopic coverage of the southern sky, 4MOST will provide an exceptionally rich dataset for studying the structure and evolution of the Universe. Following successful instrument commissioning and operational preparations, regular 5-year survey observations are expected to begin still in November 2026. The involvement of CTP PAS in both the scientific design and subsequent exploitation of these observations places its researchers in a strong position to contribute to some of the most fundamental questions in modern cosmology.

Further information:
Official 4MOST website: https://www.4most.eu/cms/home/
4MOST Consortium Members: https://www.4most.eu/cms/collaboration/consortium/