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NWO grant for the KiDS astronomical survey project

Dutch astronomers from the University of Leiden and University of Groningen were awarded a 770,000 euro grant as part of the NWO-M funding line to produce a reliable and easily accessible scientific database of sky images and source catalogs for the Kilo-Degree public survey (KiDS). The state of the art Target infrastructure, and the data management expertise of Target’s leading founder, OmegaCEN, will play an important role in the development of KiDS survey archive. The KiDS data will be delivered to the mission archive of the Euclid satellite as part of the Dutch contribution to this large scientific endeavor.

Prof. K Kuijken (University of Leiden) and Prof. E Valentijn (OmegaCEN, University of Groningen) received funding for the population of the KiDs survey database – a very large optical public survey planned by the European Southern Observatory (ESO). Using OmegaCAM, a high-sensitivity wide-field imager mounted on the VST telescope at Paranal, Chile, the KiDS survey will map the 3D distribution of light and invisible matter by observing 1500 square degrees of the extragalactic sky, using techniques such as weak gravitational lensing and photometric redshift measurements. The VST telescope became fully operational in October 2011.

The need for a large southern sky survey and the current focus on dark energy are two of the key scientific drives behind the KiDS public survey. With the ability to detect much fainter celestial objects, and produce images with higher quality compared to the Sloan Digital Sky Survey (SDSS), the KiDS scientific database is expected to help advance our understanding of cosmology, galaxy formation, dark matter and dark energy, and how they govern the expansion of the universe. The ground-based survey is also expected to serve as a reference for EUCLID – one of the future missions of the European Space Agency (ESA) aiming at studying the large-scale structure and dark energy distribution in the universe. Furthermore, the KiDS survey will be complemented by the infra-red VIKING survey planned on another
one of ESO’s telescope, VISTA. The combined multi-wavelength survey will become a powerful tool to determine distances required for the 3D mapping of dark energy and dark matter.

Mapping 1500 square degrees of the sky will require around 400 nights of observations in a period of three to four years. Each square degree will contain approximately 100,000 galaxies (the whole survey will catalogue around 150 million!). The size of the final image data per square degree will be 10GB, resulting in 15TB of total final data for the KiDS survey. Data from the survey will be processed using the Astro-WISE information system, developed by OmegaCEN, and much of the archive will be stored on the Target testbed, hosted by the Donald Smits Center of Information Technology at the University of Groningen. To achieve a high quality archive, deep understanding of the image quality control and calibration techniques used to build the survey database is of paramount importance.

Projects, like the SDSS have shown the exceptional scientific potential of large, well-calibrated and well-organized astronomical public archives. Undertaking the task of building the KiDS scientific database will position astronomers in the Netherlands at the forefront of the scientific exploration that will be made possible with the VST telescope and the KiDS survey. In addition, the KiDS archive will become accessible to the general public at an international level through sky browsers like Google Sky, World Wide telescope, or the Virtual observatory. Sky images from the survey will then be used as an educational tool to explain concepts like dark matter and entice further interest in the wonders of the universe.

As part of the Dutch contribution to ESA’s Euclid mission, the final image and catalog data of the KiDS survey will be delivered to the Euclid mission archive. Euclid will provide the ultimate measurement of the 3D distribution of dark matter and dark energy and is scheduled for launch by ESA at the end of this decade.

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TARGET SPONSORS

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