Letter of intent

File number 175.2021.012
Grant 2021/2022
Applicant
Title Two billion galaxies for cosmology: the Euclid Archive
Abstract
The European Space Agency will launch its cosmology mission Euclid in early 2023. During its 5,5-year mission the satellite’s optical and near-infrared wide field cameras will collect ~0.5 million images at Hubble Space Telescope quality covering nearly half of the sky. These will be combined with data being gathered from telescopes in Hawaii, Spain and Chile, to produce a unique archive containing images and measured properties of 2 billion galaxies, reaching out to a distance of 10 billion light years and showing the evolution of the universe over 3/4 of its lifetime.

The Euclid Archive will contain a wealth of data that will be a reference for decades to come. The primary science goal of the mission is to study the distribution of matter as a function of cosmic time, and use this to map and study the two dominant, but mysterious, components of the universe: dark matter and dark energy. Understanding their nature is the most fundamental question in cosmology today, occupying many Dutch astronomers and physicists. But in addition, the Euclid data are also of great importance to most other branches of astronomy: this is because the data are both very generic in nature (images of the night sky) but also exquisite in quality (not affected by glow or blurring by the atmosphere). Such “Legacy Science” applications span the research done across the Dutch astronomy community, from the study of stars in our own Galaxy, to finding distant black holes and understanding the buildup of galaxies over cosmic time.

Obtaining the data is one thing; turning it into a science-ready archive is quite another. That requires specialized work by experts in processing astronomical data, validating and calibrating the results of the processing, and populating the data base. The volume of data to be processed is quite extraordinary: ~200Tbytes of raw data from the spacecraft and dozens of Petabytes from the telescopes on the ground, resulting in an archive of many Petabytes of science-ready data. The Archive will initially be available to the 2000+ person strong Euclid Consortium, followed by ~yearly public data releases to the world.

The aim of this proposal is to fund the Dutch share of this Europe-wide (and beyond) endeavour to produce the Euclid science ready data and make it available in the Euclid Archive. Over the past decade astronomers in the Netherlands have contributed to - and led important aspects of - the science and mission definition, the design and implementation of the Euclid Archive System, and the distributed data processing system running the pipelines. With launch on the horizon and ground-based data already coming in, we now wish to put in place a team of experts in the Netherlands to fulfil our Euclid Archiving tasks, to ensure our participation in this final phase of Euclid, and provide this unprecedented high-quality data set for cosmology and astronomy.

Expected funding request: 2.1M€.

Domain: ENW
Disciplinecode 17.90.00
Link to Roadmap GWI: support letter from cluster astronomy/particle physics
Organisation responsible for the application

Confirm letter of intent
With submitting this form via ISAAC I declare to have filled in this form completely and truthfully.

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