

Academia Sinica Press Release

Taiwan Astronomers Jointly Developed New Instrument to Take First Ultra High Resolution Colored Image of Andromeda Galaxy

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Hyper-Suprime Cam (HSC), jointly developed by Academia Sinica Institute of Astrophysics and Astronomy (ASIAA), the National Astronomical Observatory of Japan (NAOJ), and Princeton University, has conducted observations of the Andromeda Galaxy during the commissioning run starting from June 11, 2013. The stunning images of M31, also known as the Andromeda Galaxy which is 2.5 million light years away from the Earth, demonstrate HSC's capability to fulfill astronomers' intention of producing a large-scale survey of the Universe with the power combined of 8.2 meter mirror, 1.5 degree wide field of view and the sharp imaging. This powerful instrument is unique within the current optical observational technology. HSC represents a giant step into a new era of observational astronomy and will contribute to answering questions about the nature of dark energy and matter.

The cooperation of participating institutions and organizations resulted in the delivery and installation of the major components of HSC onto the Subaru Telescope from August, 2012. The installation of Filter Exchange Unit (FEU) in June 2013 represents another important step of HSC commissioning. FEU is developed by ASIAA. During the development, Academia research team received preliminary design concept from the NAOJ and worked with Chung Shan Institute of Science and Technology, Taiwan (CSIST) to complete the system. FEU is a fully automatic system operation and can store up to six filters and position one of them in the optical path when needed. With FEU, the implementation of HSC's science goals by providing a multi-color observation is possible.

Research Fellow and Deputy Director of ASIAA Dr. Wang, Shiang-Yu, the leader of the HSC team in ASIAA, said: “It took years of efforts to successfully develop the FEU for HSC, thus turned a black-and-white camera to a colored one which maximized HSC’s observation power. With the success of FEU, our capability of astronomical instrumentation is well recognized in the international collaboration.”

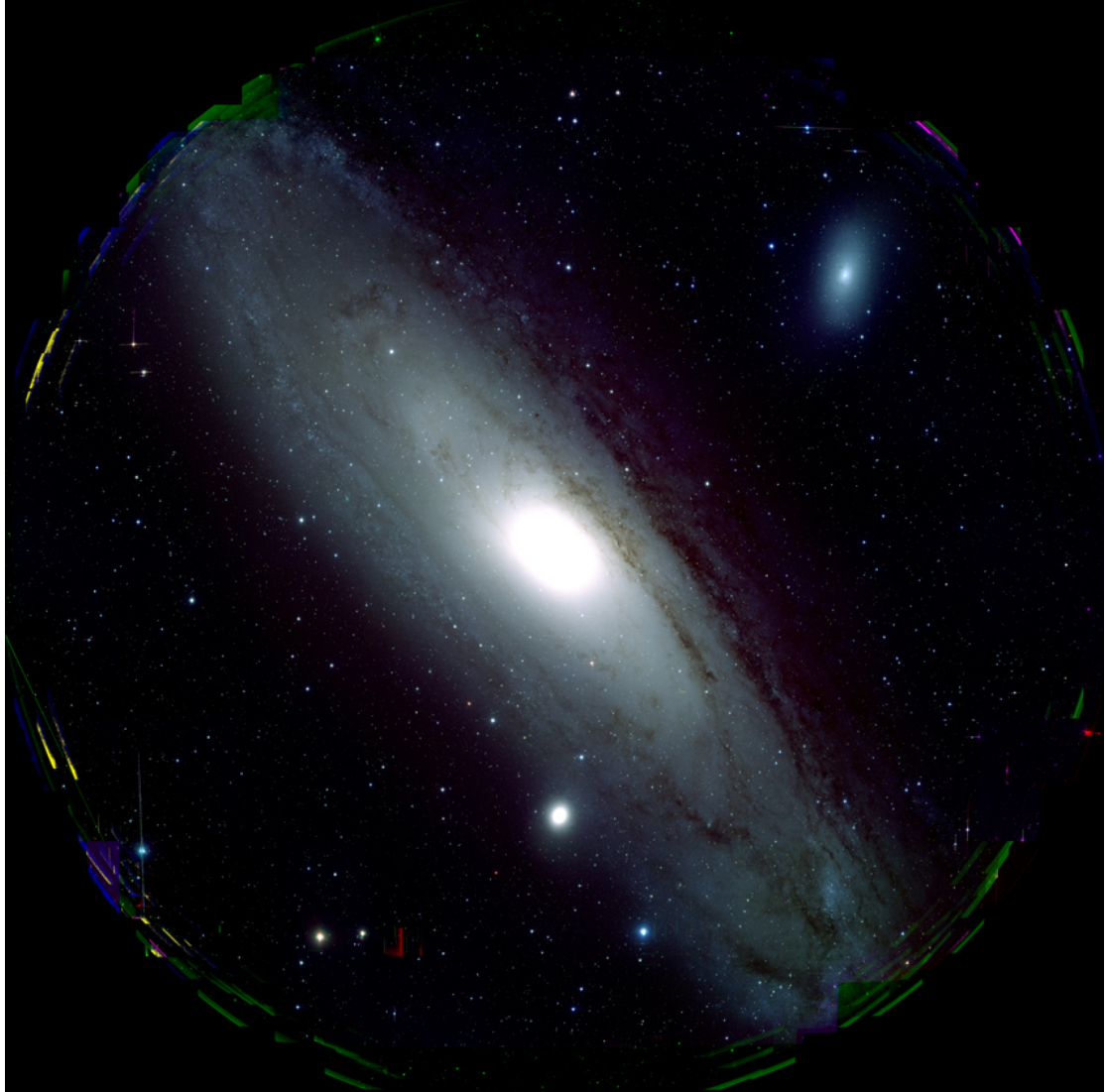
The sharp resolution in the current image augurs the instrument’s capabilities for weak lensing, which is central to HSC’s scientific goals of surveying the parameters and properties of dark matter and dark energy in the Universe as well as exploring the causes of the accelerating expansion of the Universe. The design of HSC facilitates this task with faster survey speed and expanded file size of tenfold, while maintaining image quality equivalent to Suprime Cam’s. This is crucial for a weak lensing survey, which relies on detection of a large number of sources to determine the degree of distortion occurring in the lensed image. HSC is expected to start scientific operation formally in 2014.

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HSC's first color image of M31, Andromeda Galaxy. This is only 5% of the original image size. To display all the details of this image would require a total of 45 of the highest resolution desktop monitors. (credit: NAOJ)



The center of this image shows the Prime Focus Camera (PFU), with the FEU (Filter Exchanger Unit) attached. (credit: NAOJ)