

Decoding light for clues about dark matter

May 26 2016



The Prime Focus Spectrograph will be mounted on the 8.2-metre Subaru Telescope in Hawaii. Credit: Prime Focus Spectrograph Project

An international team of researchers is developing an instrument that will decode the light of the night sky to understand the nature of dark



matter.

The Prime Focus Spectrograph (PFS), which will be mounted on the 8.2-metre Subaru Telescope in Hawaii, splits up the light from celestial objects such as stars and galaxies, into various wavelengths. The emerging data set is called a "spectrum". From this, scientists can obtain clues of any <u>celestial object</u>'s motion.

This is important to scientists because <u>dark matter</u>, the mysterious force keeping our universe together, affects the direction and speed at which stars move. By looking at how a million stars move, scientists can create a map of where dark matter is and how it behaves. The project is an initiative of the Kavli Institute for the Physics and Mathematics of the Universe.

While conventional spectroscopy techniques can only observe a handful of objects at one time, PFS will make it possible to collect spectra from up to 2,400 objects at the same time. This will effectively make a "census" of the universe much more quickly than before, and will be crucial for any measurements and analyses needing large statistics.

Although spectroscopy has been used since Newton's days to study the characteristics of <u>stars</u> and galaxies, PFS will be able to analyse a large amount of light in the <u>night sky</u> collected by the Subaru Telescope's 8.2m primary mirror, enabling scientists to look at the universe in great depth. Subaru will also be able to make sharp images of objects more than ten billion light years away, adding to the amount of information PFS can provide.

Sub-components and sub-systems of the PFS instrument are now being built, assembled and tested in the U.S., France, Brazil and Taiwan. They will be shipped to the Subaru Telescope in Hawaii by 2018. After the system integration and tests on the telescope, the PFS is expected to be



ready for science operations in 2019.

Provided by ResearchSEA

Citation: Decoding light for clues about dark matter (2016, May 26) retrieved 25 April 2024 from <u>https://phys.org/news/2016-05-decoding-clues-dark.html</u>

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