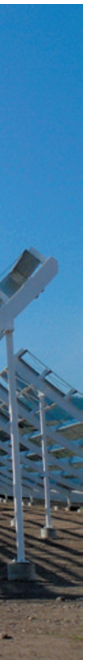

But cosmologists have struggled to measure the expansion rate in the interim, leaving open the question of whether the strength of dark energy's repulsive force may have varied over time.

CHIME is designed to fill the gap, says Kendrick Smith, an astrophysicist at the Perimeter Institute for Theoretical Physics in Waterloo, Canada, who will work on analysing CHIME's data. The half-pipe antennas will allow CHIME to receive radio waves coming from anywhere along a narrow, straight region of the sky at any given time. "As the Earth rotates, this straight shape sweeps out the sky," says Smith.

To sort out where individual signals are coming from, a custom-built supercomputer made of 1,000 relatively cheap graphics-processing units — the type used for high-end computer gaming — will crunch through nearly 1 terabyte of data per second. The team will also use signal amplifiers originally developed for mobile phones. Without such powerful consumer-electronics components, CHIME would have been prohibitively expensive, says experimental cosmologist Keith Vanderlinde of the University of Toronto, Canada, who is co-leading the project.

CHIME's supercomputer will look specifically for radio waves with a wavelength that suggests an age of 11 billion to 7 billion years, emitted by the hydrogen in the interstellar space inside galaxies (at their source, such emissions have a wavelength of 21 centimetres). Researchers will then subtract the 'radio noise' in the same wavelength range that comes from the Milky Way and Earth.

Although CHIME will not be able to distinguish individual galaxies in this way, clumps of hundreds or thousands of galaxies will show up, says Vanderlinde. This will allow researchers to map the expansion rate of the voids between the clumps, and in turn to calculate the strength of dark energy during that time.

"As the Earth rotates, this straight shape sweeps out the sky."

If the results imply that the strength of dark energy then was the same as it has been in the past 6 billion years, it could suggest that galaxies will eventually lose sight of each other. But if the strength of dark energy has changed over the eons, all bets are off: the Universe could collapse in a 'big crunch', for example, or be ripped apart into its subatomic components.

As well as mapping the adolescent Universe, CHIME could also detect hundreds of the mysterious 'fast radio bursts' that last just milliseconds and have no known astrophysical explanation. And it will help other experiments to calibrate measurements of radio waves from rapidly spinning neutron stars, which researchers hope to use to detect the ripples in space-time known as gravitational waves (see *Nature* **463,** 147; 2010).

CHIME is part of a growing trend in astronomy. A number of experiments that are now active or in the planning stages, including the hotly anticipated Square Kilometer Array — to be built on sites in Australia and South Africa — are designed to look at hydrogen emissions with 21-centimetre wavelengths. These emissions are an untapped trove of cosmological information, says Tzu-Ching Chang, an astrophysicist at the Academia Sinica Institute of Astronomy and Astrophysics in Taipei who helped to pioneer the hydrogen mapping of galaxies in a 2010 study (T.-Z. Chang *et al. Nature* **466,** 463–465; 2010). She likens the boom in hydrogen mapping today to the trend in the 1990s of studying the relic radiation of the Big Bang, which revolutionized cosmology. ■

CLARIFICATION

The News story 'US tailored-medicine project aims for ethnic balance' (*Nature* **523,** 391–392; 2015) implied that the plan for the whole Precision Medicine Initiative is due to be announced in the next few weeks. Actually, the forthcoming plan is just for the cohort-study component of the project.