Dutch radio antenna to depart for the moon on Chinese mission

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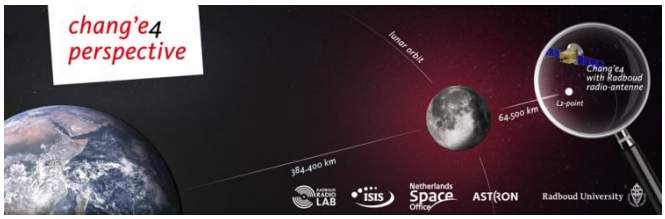

Behind the Moon the satellite revolves around a fixed point, the so-called second Lagrange point or L2 point of the Earth-Moon system. That point is about 65,000 kilometers from the Moon. Credit: Radboud Radio Lab?

On 21 May 2018, the Chinese space agency will launch the relay satellite Chang'e 4 to an orbit behind the Moon. On board will be a Dutch radio antenna, the Netherlands Chinese Low-Frequency Explorer (NCLE). The radio antenna is the first Dutch-made scientific instrument to be sent on a Chinese space mission, and it will open up a new chapter in radio astronomy. The is instrument developed and built by engineers from ASTRON, the Netherlands Institute for Radio Astronomy in Dwingeloo, the Radboud Radio Lab of Radboud University in Nijmegen, and the Delft-based company ISIS. With the instrument, astronomers want to measure radio waves originating from the period directly after the Big Bang, when the first stars and galaxies were formed.

Why is it so important for the measuring instruments to be placed behind the Moon? Professor of Astrophysics from Radboud University and ASTRON Heino Falcke: "Radio astronomers study the universe using radio waves, light coming from stars and planets, for example, which are not visible with the naked eye. We can receive almost all celestial radio wave frequencies here on Earth. We cannot detect radio waves below 30 MHz, however, as these are blocked by our atmosphere. It is these frequencies in particular that contain information about the early universe, which is why we want to measure them."

Special about the radio antenna is that it will receive low frequency radio waves with a large frequency range. "In the past this was not possible and therefore a receiver with a narrow frequency band was used, in order to avoid electromagnetic interference of the satellite itself," explains project leader Albert-Jan Boonstra of ASTRON. "We have now succeeded in avoiding the electromagnetic interference and making a broadband receiver. That is, of course, good news for subsequent missions and can, for example, be used for future nano-satellites."

The radio antenna Netherlands Chinese Low-Frequency Explorer (NCLE), developed by ASTRON, Radboud Radio Lab, ISIS and NAOC. Credit: Radboud Radio Lab / ASTRON / Albert-Jan Boonstra?

The instrument passed an important risk assessment review by the Chinese space agency at the end of April. Marc Klein Wolt, Managing Director of the Radboud Radio Lab, is looking back

on the endeavour with a sense of accomplishment: "The last few months have been quite challenging for the Dutch team, who have put in a lot of effort to complete the instrument for the launch as the final phase of a two-year bi-lateral project with our Chinese counterparts. The Chinese lunar programme is like a bus we were trying to catch, mostly due to the hard work and enormous dedication from the teams on both sides". On April 30, the antenna successfully passed final pre-flight test. Heino Falcke reported: "Antennas were successfully deployed and retracted. Next step in this adventure is the L2-point behind the Moon."

In 2016, the Netherlands Space Office and its Chinese counterpart CNSA signed an agreement to cooperate in this project, which was an elaboration of the Memorandum of Understanding the two space agencies signed the year before during a trade mission in presence of the Chinese President Xi Jinping and the Dutch King Willem Alexander. "NCLE does not only pave the way for new exciting science, but also provides new means for the two countries to expand their international collaboration," says Mr. Harry Forster of the NSO.

The Netherlands Chinese Low-Frequency Explorer (NCLE) was built by a team of researchers and engineers from the Netherlands Institute for Radio Astronomy (ASTRON) in Dwingeloo, the Radboud Radio Lab of the Radboud University, and the Delft company ISIS in the Netherlands in collaboration with a team from the Chinese National Astronomical Observatory of the Chinese Academy of Sciences (NAOC).

Provided by Netherlands Research School for Astronomy