Counting Down to a Liquid Mirror Telescope on the Moon

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A 3.7 meter diameter liquid mirror at Université Laval in Quebec, Canada. The liquid is mercury. There are no detectable mercu because a thin transparent layer of oxide covers the surface. (Image Credit: Guy Plante, Université Laval)

capable of functioning even in the difficult lunar environment.

This work was carried out by Ermanno Borra and Omar Seddiki of the Université Laval, and by their Canadian, American, and

"It's the breakthrough that we need," lead researcher Ermanno Borra said. "If you want to have a liquid mirror telescope on th liquid. If you don't have the right liquid, forget it. It's as simple as that."

The reflecting telescopes liquid telescopes are distinguished from conventional telescopes by their primary mirror, which is ma than manufactured out of glass. The reflective liquid is placed in a spinning container and the liquid is spread out in a thin perf During two last decades, Professor Borra proved the feasibility of this process by manufacturing increasingly larger mirrors. M of British Columbia built a liquid mirror with a diameter of 6 meters, which makes of it the 13th larger astronomical mirror in t

"We have shown how the moon is ideal (for) using liquid mirror technology to build a telescope much larger than we can affo Pete Worden, director of NASA Ames Research Center in California. "Such telescopes, perhaps 100 meters in diameter can see universe after the Big Bang," Worden added.

"The lunar, liquid-mirror project was supported by the NASA Institute for Advanced Concepts. It enabled a team of scientists i moon might support astronomy," Worden explained.

In 1991, Ermanno Borra proposed the installation of a liquid reflecting telescope on the Moon. Such an instrument, he stated, and economic advantages compared to the conventional earth-based telescopes. Released from the disturbances created by th observatory equipped with such a mirror could deliver new information on the origin of the Universe and astronomers hope th

them to study the early phases of the universe after the Big Bang.

The idea, which seemed like science fiction at the time, took on new life in 2004 when the NASA Institute for Advanced Conce which supports projects that have the potential to greatly advance the limits of space science and technology, granted its fina project.

The principal challenge of the project consisted in finding a liquid able to resist the conditions which prevail on the surface of t function at a temperature of -143 degrees Celsius to allow the observation in the infra-red spectrum. "Heat does not pose a pr observatory would be installed in the South Pole of the moon, in a crater which is never exposed to the Sun" according to Erm other hand, it was necessary to find reflective liquids which remain liquid at temperatures of about -150 degrees Celsius and v evaporate."

The solution came from the work undertaken by the student-researcher Omar Seddiki. The researchers managed to deposit, b vaporization, a coating on an ionic liquid. The resulting surface is perfectly smooth, has good reflectivity, and remains stable f liquid on which the layer of reflective silver rests does not evaporate and has a melting point is of - 98 degrees Celsius. "We u ionic liquid for our tests," announces professor Borra. With further research, "we believe we can find materials which will rema temperatures much lower."

The liquid mirror for the lunar telescope would have a diameter of between 20 and 100 meters, which would provide a sensitiv more than that of the next generation James Webb Space Telescope, due for a 2013 launch. The researchers think any liquid- the moon would not come before 2020 at the earliest.

A large telescope on the moon would be more cheaply and easily built using a liquid mirror rather than a conventional glass or advanced optical qualities of such an instrument, Ermanno Borra puts forward its practical side. "Instead of transporting mirro expensive, and complex glass, whose installation would require painful adjustments, we will be able to bring the liquid mirror assemble the whole thing on the Moon."

For more information:

http://www.nasa.gov/centers/ames/news/releases/2007/07_36AR.html

http://www.aufil.ulaval.ca/articles/pas-plus-vers-lune-665.html

http://www.int.iol.co.za/index.php?click_id=31&art_id=nw20070622014234147C308352&set_id=