



RESEARCH

LGWA: THE NEW PROJECT TO MEASURE GRAVITATIONAL WAVES ON THE MOON

Is it possible to detect gravitational waves on the Moon? This is the challenge proposed by the international team of scientists and engineers of the Lunar Gravitational-Wave Antenna (LGWA) collaboration, to which INFN is contributing together with the Gran Sasso Science Institute (GSSI), the National Institute of Astrophysics (INAF), the National Institute of Geophysics and Vulcanology (INGV) and Italian Aerospace Research Centre (CIRA). The proposal, which entails the installation of a network of lunar sensors capable of detecting the vibrations of our satellite produced by the passage of gravitational waves, was presented in a study published in the *Astrophysical Journal*, dedicated to the theoretical analysis of a similar scenario in the NASA and ESA programmes that plan the return of man on the Moon and the construction of permanent bases on our satellite in the near future.

This idea was at the basis of Joseph Weber's work some 50 years ago and led to the creation of the Lunar Surface Gravimeter, a gravimeter placed on the lunar surface in 1972, with the Apollo 17 mission, which, however, missed its research objective. The study proposes an extension of the lunar gravimeter idea in which the Moon itself is an essential part of the detector, thanks to its intrinsic mechanical capacity to respond to gravitational waves. Moreover, the study identifies as a theoretical possibility a system consisting of a network of seismographs placed at the South Pole of our satellite. This solution presents ambitious environmental and technological challenges, such as the development of a new generation of lunar seismographs. ■