UNIVERSITÉ DE GENÈVE

PRESS RELEASE

Geneva | 5 June 2024

UNIVERSITÄT BERN

ANDES, the spectrograph in a quest for life in the Universe

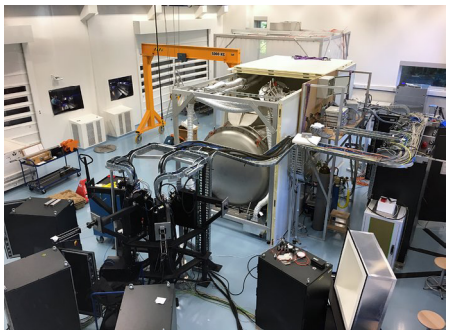
ESO is endorsing a new spectrograph for its future giant telescope. Switzerland is contributing thanks to its expertise in exoplanets and in high-precision instruments.

WARNING: embargoed until 5 June 2024, 3.00 pm GMT

The European Southern Observatory (ESO) has started the design and construction of the *ArmazoNes high Dispersion Echelle Spectrograph* (ANDES) with an international consortium involving the University of Geneva (UNIGE) and the University of Bern (UNIBE), the two host institutions of the National Centre of Competence in Research (NCCR) PlanetS. The project will cost approximately 120 million euros and Switzerland is one of the main contributors both on the instrumental and scientific levels. This spectrograph of second generation will be installed at the Extremely Large Telescope (ELT), the future giant telescope of 39 meters diameter, currently under construction in Chile. ANDES will enable amongst others, to probe the atmosphere of exoplanets looking for traces of life, or to study exoplanets forming in their protoplanetary disks.

The agreement for the design and the construction of ANDES, between ESO and the consortium of institutions which UNIGE and UNIBE are part of, has been signed today at the headquarters of ESO in Germany, by ESO's Director General Xavier Barcons, and Roberto Ragazzoni, president of the Italian National Institute for Astrophysics (INAF). INAF is leading the consortium of this instrument costing 120 million euros and involving 13 countries, the equivalent of a small space satellite.

ANDES is a powerful spectrograph, an instrument decomposing light in its various colors, allowing astronomers to determine the properties of astronomical objects, such as their chemical composition. It will be installed at ESO's Extremely Large Telescope (ELT), the future telescope of 39 meters in diameter, already in construction on the Armazones mountain, in the Atacama Desert in Chile. The instrument will have a record precision in the visible and near infrared wavelengths, and joint with the powerful mirror system of ELT, will pave the way to new research covering several domains of astronomy.



© UNIGE

ANDES benefits from the expertise developed at the UNIGE. The RIZ spectrograph will be assembled and tested in the Astrotech's cleanroom, as was ESPRESSO.

"UNIGE contribution will focus mainly on one of the 4 spectrographs that together will make ANDES, the RIZ spectrograph (in the red and near infrared wavelengths) for the instrumental aspect, and on the use of ANDES for exoplanetary systems, for the scientific aspect," explains Christophe Lovis, associate professor at UNIGE and Swiss representative in the ANDES consortium. "ANDES will indeed enable to probe the atmosphere of exoplanets to search for biosignatures. It

High resolution pictures

will be a key asset for the scientists of the Life in the Universe research Center (LUC), the newly created research center of UNIGE which tackles the difficult question of life elsewhere in the Universe" details Christophe Lovis.

If the official signature happened today, the teams of the department of astronomy of UNIGE are already on the look-out. "We already have a strong optical design for the RIZ spectrograph but some challenges remain to consolidate it. An example: the dimensions of the telescope are so big that optical components of the spectrograph, which themselves will be large, need to stay align to less than a 10'000th of the thickness of a hair, to enable us to detect the signal of an exo-Earth," reveals Audrey Lanotte, optical engineer at UNIGE. "The project already involves a dozen specialists at UNIGE. This type of project requires an excellent coordination between the different professions. It is very stimulating!" adds Audrey Lanotte.

UNIBE is also contributing to ANDES by providing another key component of the instrument: the light distribution point system. It will enable the cross-calibration of the multiple spectrographs with stable light sources. "Switzerland is one of the main contributors of this instrument. The expertise and historical collaboration between UNIBE and UNIGE, consolidated the last few years through the NCCR PlanetS, enable Switzerland to position itself as an international reference and leader regarding research and the development of high-precision instrument for the observation and the study of exoplanets, including their formation process," concludes Christoph Mordasini, professor and executive director of the Space and Planetary Science Research Division (WP) of UNIBE.

ELT and its 39 meters of diameter should see their first light in 2028, while ANDES will be installed a few years later, around 2032. On top of its unique contribution to the search for exoplanets and life in the Universe, the pairing of ELT with ANDES will enable unprecedented advancement in other fields of astrophysics such as the measurement of physics' fundamental constants, the study of distant galaxies, or the detection of the first stars of the Universe.

contacts

Christophe Lovis
Associate Professor
Department of Astronomy
Faculty of Science
University of Geneva
+41 22 379 24 07
christophe.lovis@unige.ch

Audrey Lanotte
Scientific assistant
Optical engineer
Department of Astronomy
Faculty of Science
University of Geneva
+41 22 379 23 44
Audrey.Lanotte@unige.ch

Christoph Mordasini
Professor
Space and Planetary Science
Research Division
UNIBE
+41 31 684 51 58
christoph.mordasini@unibe.ch

Exoplanet research in Geneva: 25 years of expertise awarded a Nobel Prize

CHEOPS provides crucial information on the size, shape, formation and evolution of known exoplanets. The installation of the «Science Operation Center» of the CHEOPS mission in Geneva, under the supervision of two professors from the UNIGE Astronomy Department, is a logical continuation of the history of research in the field of exoplanets, since it is here that the first was discovered in 1995 by Michel Mayor and Didier Queloz, winners of the 2019 Nobel Prize in Physics. This discovery has enabled the Astronomy Department of the University of Geneva to be at the forefront of research in the field, with the construction and installation of HARPS on the ESO's 3.6m telescope at La Silla in 2003, a spectrograph that remained the most efficient in the world for two decades to determine the mass of exoplanets. ESPRESSO is the latest spectrograph built in Geneva and installed on the VLT in Paranal, and it is now reaching an even higher precision than HARPS.

CHEOPS is therefore the result of two national expertise, on the one hand the space know-how of the University of Bern with the collaboration of its Geneva counterpart and on the other hand the ground experience of the University of Geneva supported by its colleague in the Swiss capital. Two scientific and technical competences that have also made it possible to create the National Center of Competence in Research (NCCR) PlanetS.

Bernese space exploration: With the world's elite since the first moon landing

When the second man, «Buzz» Aldrin, stepped out of the lunar module on July 21, 1969, the first task he did was to set up the Bernese Solar Wind Composition experiment (SWC) also known as the "solar wind sail" by planting it in the ground of the moon, even before the American flag. This experiment, which was planned, built and the results analyzed by Prof. Dr. Johannes Geiss and his team from the Physics Institute of the University of Bern, was the first great highlight in the history of Bernese space exploration.

Ever since Bernese space exploration has been among the world's elite, and the University of Bern has been participating in space missions of the major space organizations, such as ESA, NASA, and JAXA. With CHEOPS the University of Bern shares responsibility with ESA for a whole mission. In addition, Bernese researchers are among the world leaders when it comes to models and simulations of the formation and development of planets.

The successful work of the Department of Space Research and Planetary Sciences (WP) from the Physics Institute of the University of Bern was consolidated by the foundation of a university competence center, the Center for Space and Habitability (CSH). The Swiss National Fund also awarded the University of Bern the National Center of Competence in Research (NCCR) PlanetS, which it manages together with the University of Geneva.

UNIVERSITÉ DE GENÈVE
Communication Department
24 rue du Général-Dufour
CH-1211 Geneva 4

Tel. +41 22 379 77 17

media@unige.ch
www.unige.ch