ESO

European Organisation
for Astronomical
Research in the
Southern Hemisphere

The European Organisation for Astronomical Research in the Southern Hemisphere (ESO) is the foremost intergovernmental astronomy organisation in Europe and the world's most productive ground-based astronomical observatory. ESO carries out an ambitious programme focused on the design, construction and operation of powerful ground-based observing facilities enabling astronomers to make important scientific discoveries.

ESO operates three unique world-class observing sites in northern Chile: La Silla, Paranal and Chajnantor (home to ALMA and APEX), and the ESO Headquarters are located in Garching, near Munich, Germany.

At Paranal, ESO operates the Very Large Telescope, the world's most advanced visible-light astronomical observatory, and will host and operate the southern array of the Cherenkov Telescope Array, the world's largest and most sensitive high energy gamma-ray observatory. ESO is a major partner in ALMA, the largest astronomical project in existence. And on Cerro Armazones, ESO is building the 39-metre Extremely Large Telescope (ELT), which will become "the world's biggest eye on the sky" and whose operations will be fully integrated into the Paranal Observatory.

For its Office for Science within the Directorate for Science at its Vitacura office in Santiago, Chile, ESO is offering the opportunity to a interdisciplinary Masters Student in the areas of:

Atmospheric Science/ Astronomy/ Structural Engineering

ESO astronomers are participating in the design of a new facility, the Atacama Large Aperture Submm Telescope (AtLAST: https://www.atlast.uio.no/), a 50-metre submm telescope on the 5000m high Chajnantor plateau in Northern Chile. The second phase of this study is funded by a European Union's Horizon Europe programme (under agreement number 101188038 (AtLAST2)). Under this agreement, ESO is offering a student the opportunity for a period of one year to work on the atmospheric characterization of the two selected sites in Chile. Here, two identical 24-metre high weather towers have been collecting wind speed data at 20 Hz sampling rate since late 2023. The wind speed data analysis is needed to provide input and restrictions to the structural design of the future 50-metre telescope.

Main Duties and Responsibilities:

- Compile all the data from the anemometers;
- Automatically identify and flag any unreliable data from the anemometers;
- Organize the cleaned-up data in a public database;
- Compare the simultaneous measurements from both sites to determine which site has lower wind speeds;
- Determine and compare the vertical wind profile on both sites using the 3-dimensional measurements;
- Determine the wind power spectra on both sites;
- Determine the diurnal and seasonal variation of the above wind parameters;
- Link the historical wind measurements with climate models to predict the evolution of the wind speed over the desired 50-year lifetime of AtLAST.

Key Competencies and requirements for the delivery of the services:

- Knowledge and experience on descriptive and inferential statistics. This knowledge will be applied to the analysis of meteorological data, in particular wind speed data that has been acquired at a high sampling rate (10, 20 Hz), and consequently will be applied to a high volume of data.
- Familiarity with SQL or similar database framework is an asset.

- Knowledge and experience on the use of power spectral analysis to one-dimensional data. This knowledge will be applied to the spectral analysis of wind speed data acquired with sonic anemometers, at rates of 10Hz and 20Hz.
- Knowledge of atmospheric turbulence would be beneficial, but the main aspects of the theory can be learned as part of this research. This involves aspects such as turbulent momentum fluxes computed from relatively high sampling of the horizontal and vertical wind speed fields.
- Knowledge of atmospheric boundary layer physics would be beneficial, but the main aspects of the theory can be learned as part of this research. This involves aspects such as: atmospheric stability, Monin–Obukhov length, vertical Log wind profile.
- Knowledge of global numerical weather data sets, such as ERA-5 and MERRA-2 reanalysis datasets.
- Previous experience with software tools to extract and manipulate weather data from reanalysis data sets will be beneficial, though the use of existing tools can be learned as part of this research. The student will have to manipulate large datacubes consisting of atmospheric variables data.
- Knowledge and experience of Python language programming, as well as of any other data analysis tool (such as Octave, Matlab, other), is essential.

Qualifications:

Applicants must have at least a Bachelor diploma in atmospheric science, computer science, structural engineering or another relevant subject.

Language Skills:

The position requires an excellent command of English, both written and spoken. Spanish language skills are a plus.

Remuneration and Contract:

The duration of the contract is limited to one year. A modest living allowance will be offered for the duration of the programme up to the indicative max limit of 1,840 Euro per month (reference stipend).

Duty Station:

ESO's offices in Vitacura, Santiago (Chile). Due the requirement to work at the ALMA Observatory site at 5000m above sea level, a successful high-altitude medical examination (HAME) is a necessary condition of employment for this position. Up to 2 months of the contract will be spent at the ESO headquarters in Garching, near Munich, Germany.

Application:

If you are interested in working in areas of frontline science and technology and in a stimulating international environment, please visit http://www.eso.org for further details.

Applicants are invited to apply online at http://jobs.eso.org/. Applications must be completed in English and should include the following material:
- a **Motivation Letter** of up to one page outlining connection with this field of interest.

- a **CV** containing details of your highest qualification level and dates. If you are currently enrolled in a Masters programme, please state the university/institute and the start and expected finish dates. Please outline the programming languages you can use (and your level of proficiency), any experience using astronomical software, and any other relevant technical skills.

Deadline for applications is 15 February 2025.

Interviews are expected to be held in mid March 2025, online via MS Teams.

ESO Values

An important element in any successful employment relationship is harmony in values between an organisation and its people.

The ESO Values are:

ESO strives for **excellence** through **innovation.**

ESO provides **outstanding services** to its communities.

ESO fosters **diversity & inclusion**.

ESO believes in the key role of **sustainability** for its future.

Achieving the above are recognized as only possible on the basis of personal values and attitudes that we expect from our employees: **respect, integrity, accountability, commitment, collaboration, and clear & open communication.**

Applicants to any ESO role are asked to reflect on their affinity with these values and advised they may be asked about them if called for interview.

Diversity

ESO has established diversity as an important value of the Organisation, is committed to providing an equal opportunities environment and is actively seeking to promote a diverse, equitable and inclusive workforce. Please visit https://www.eso.org/public/about-eso/sustainability/dei-at-eso/ for further details.

Nationality

No nationality is in principle excluded from employment at ESO, however, recruitment preference will be given to nationals of our Member States, host states and strategic partners: Australia, Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Poland, Portugal, Spain, Sweden, Switzerland, the United Kingdom and Chile, irrespective of gender, age, disability, sexual orientation, ethnicity or religion.