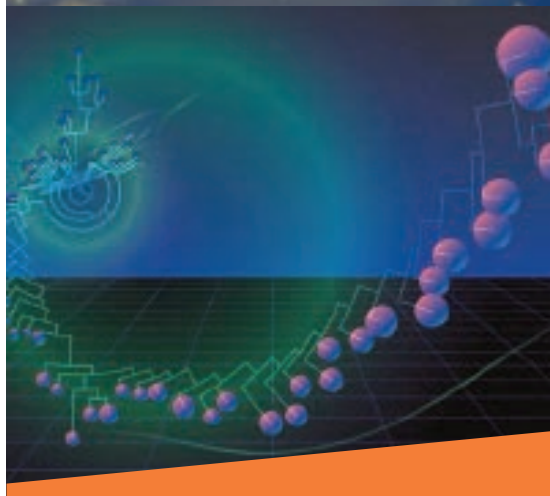
Agencia Nacional de Investigación y Desarrollo

Ministerio de Ciencia, Tecnología, Conocimiento e Innovación

Millennium Nucleus

MILLENNIUM NUCLEUS EVOLUTIONARY RECONSTRUCTION OF THE INTERSTELLAR MEDIUM, **ERIS**

Focus Area: Environment and Energy.
Specialty: Physical chemistry, Catalysis.



The ERIS Millennium Nucleus aims to reconstruct the evolution of galaxies such as the Milky Way using phylogenetic trees, which are already widely used in other evolutionary biology studies. Since trees are mathematical structures and graphs, ERIS is consolidating an interdisciplinary collaboration between astronomers, biologists and mathematicians, in order to achieve this goal.

The Nucleus focuses on reconstructing the evolution of the Milky Way, because it is the best laboratory, but the objective is to expand into extragalactic astronomy, building and interpreting phylogenetic trees suitable for astronomical data. To do this, the evolution of galaxies is simulated, where their shared history is known. Observed data is also used, allowing the Milky Way to be explored and ultimately helping to constrain the theory of galactic evolution.

To advance this problem, 5 lines of research have been defined, each of them with members of the ERIS Millennium Nucleus who, supervising young researchers, advance their research.

One of the objectives of ERIS is to advance these lines of research so that they interact and disciplines merge. Notable examples where these lines have merged are the two articles presented in 2023 where phylogenetic trees have been studied in both simulated data (Article I) and observed data (Article II). These works demonstrate how the team, each member from their own discipline, is capable of converging on results that can generate literature on a new topic.

Research lines:
- Numerical simulations of galaxy evolution.
- Analysis of stellar population data both spectral and dynamic.
- Generation of phylogenetic tools applied to astronomical data.
- Star structure and evolution.

>> SCIENTIFIC PRODUCTIVITY:

ISI-WOS: 17

Millennium Nucleus

>> CONTACT:

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>> RESEARCHERS:

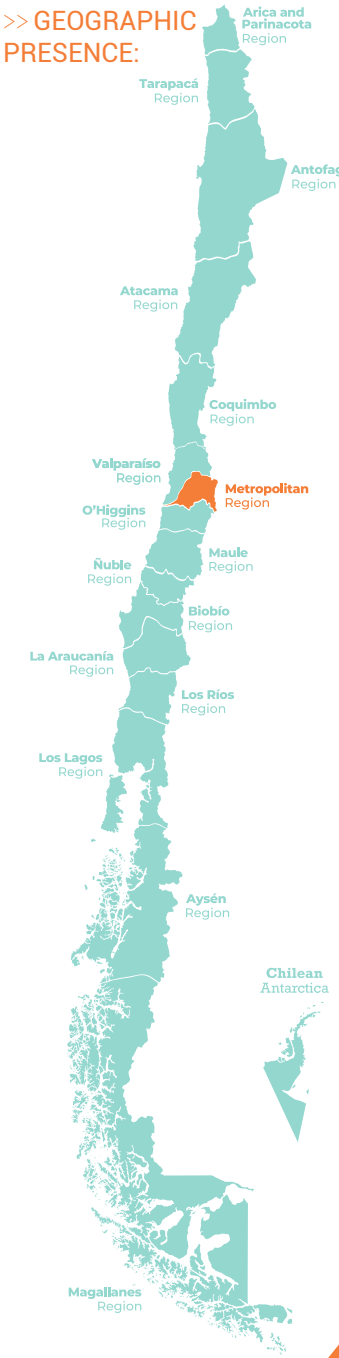
Main tesearchers:
Evelyn J. Johnston, Álvaro Rojas, Keaghan Yaxley, Scarlet Elguetam Emanuel Sillero.

Assistant Researchers:
Payel Das, Robert Yates, Xia Hua, Manuela Zoccali, Claudia Aguilera.

Senior Researchers:
Gerry Gilmore, Robert Foley. Jaime San Martín.

Junior Researchers:
Nicole Buckley, Jenny Gonzalez, Danielle de Brito, Sara Vitali, Theo Signor, Brian Tapia, Keerthana Jegatheesan, Anell Cornejo, Francisco Jara, Kurt Walsen, Alvaro Marquez, Paula Silva.

>> GEOGRAPHIC PRESENCE:



>> MAIN ACHIEVEMENTS:

- ERIS demostró la viabilidad y potencia de la filogenética galáctica con la publicación de su primer artículo, escrito completamente por miembros de ERIS.
- Paula Jofre obtuvo el reconocimiento de 100 mujeres líderes 2023, otorgado por El Mercurio y Mujeres Empresarias.
- Paula Jofre fue incluida en la lista de las 30 mujeres más poderosas de Chile por Forbes 2023.
- Evelyn Jhonston obtuvo el título de arquitecta de SDSS-V por SDSS por su contribución a las operaciones del Local Volume Mapper (LVM).
- Jaime San Martin obtuvo el Premio Nacional de Ciencias Exactas 2023 por su contribución fundamental en matemáticas a la sociedad chilena.
- Patricia Tissera, obtuvo el Premio Charreau 2022. Fue nominada con base en su trayectoria científica.
- Paula Jofre fue galardonada con una beca de Ciencia Pública para distribuir el libro "Fósiles del Cosmos" en las escuelas asociadas al programa Gen Universal

>> OUTREACH ACTIVITIES:

- Between 2022 and 2023, thousands of children from 15 schools in four Chilean regions participated in our outreach program, Gen Universal, which aims to incorporate the scientific method and critical thinking.
- During 2023, the ERIS Millennium Nucleus was awarded a PME to develop skills to deal with emotions, especially frustration, in the learning process of young people.
- In addition, Fósiles del Cosmos, a book written by the director of the nucleus, was selected to be one of the 10 books that represent Chile at the largest international book fair in Spanish, in Guadalajara. That gave the opportunity to massively introduce the idea of ERIS to the Mexican public through a public talk, radio and television interviews, and visualize the role of women in STEM through their own examples.

Information updated to December 2024

Sponsoring Institutions:
University Diego Portales
Pontificia University Católica

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