Searching for the origin of the universe

Since humanity obtained awareness of the self and of the surrounding world, civilizations have sought to understand the origin of the universe in which we live. Today, Dr. Patricia Tissera, astronomer and academic from the Faculty of Exact Sciences at the Universidad Andrés Bello, is tackling this inquiry by studying the formation and evolution of galaxies, fundamental building blocks in the structure of the cosmos.

Funded by a Fondecyt grant and in collaboration with UNAB post-doctoral scholarship recipient Dr. Rubens Machado, this project uses numerical models and computational simulations to identify observable patterns or events that imprinted unique characteristics during the formation of galaxies. These data can be used to establish relationships between observable events and the origin of the galaxies.

In this regard, Dr. Tissera explains that, in observational terms, there are known relationships between the dynamic properties of galaxies and chemical abundances. However, "understanding how these chemical patterns originated in different galaxies and how these evolved over time is crucial for determining the best model of galaxy formation."

To carry out this study, Dr. Tissera uses numerical models of the universe and computational simulations that predict the behavior of certain spatial phenomena under determined parameters.

Dr. Tissera comments, "These models permit coding for different physical mechanisms and processes that we believe are relevant during galaxy formation, information that is then applied to create virtual universes. These numerical tools are very powerful since they give us the ability to follow the evolution of a universe and of the galaxy from the Big Bang until now."

"These virtual galaxies can be studied, and their properties compared with real galaxies. From these comparisons, we can conclude if our hypotheses were correct or if modifications should be made. Step-by-step, we will be able to elucidate the formation of the universe," explains Dr. Tissera.