

# The mystery of our universe

[Science](#), [Astronomy](#)



The vast ocean of space is full of starry islands called galaxies. These objects, extraordinarily beautiful and diverse in their own right, not only are the localities within which stars form and evolve but also act as the lighthouses that allow us to explore our Universe over cosmological scales” . The ocean is like space and islands are like the collection of stars. We are living inside of the lighthouse where every galaxy what we observe today is governed by the law of physics. The matter, energy, and radiation are an essential ingredient for the building block of our Universe. The understanding of the vastness of the space is a quite challenging and an important question for the physicists. There are several questions like that how does dark matter contribute to the formation and evolution scenario of the galaxies? What are the key features of the dark matter? How did stellar halo formed in the early Universe? How do stars form and evolve on the different time scale? These queries are generally asking while doing the research in astronomy.

In 1962, Eggen, Lynden-Bell, and Sandage published their remarkable scholar paper entitled “ Evidence from the motions of the old star that the Galaxy collapsed”, studied a larger sample of high-velocity stars motion. According to it, the Galaxy was formed in a state of rapid gravitational collapse from its gaseous prostate to its equilibrium state, that finally came to the rotationally supported disk. This paper also noted that while decreasing the orbital angular momentum, the energies and eccentricities of the orbit of stars are increased with the decrease of metal abundance.

ESL picture could not address on the pure halo sample, even it was valid for some sample like disk and halo stars, because of kinematic bias in their selected samples. Thus, some authors doubted the potentiality of the

kinematic bias in their sample selection. Several authors challenged the ESL picture, especially in the formation of inner halo. They argued that the inner and outer halo stars have to form in the different time scale which is not followed as suggested by ESL picture. After some decades, Searle & Zinn (1998) cite{searle1978compositions} studied the dynamical properties of the globular cluster and their distribution in the Galaxy.

Importantly, SZ clearly hypothesized the galaxy formation and evolution. The clustering of the outer halo was a slow and more chaotic process for the origin of the Galaxy. Its formation is based on the paradigm of the bottom-up scenario. In the bottom-up scenario, the galaxies formed through the amalgamation of several smaller fragments. This considerable paradigm is, therefore, called the hierarchical model. Due to the beauty of the hierarchical model, the concept of galaxy formation has been changed. Likewise, White and Rees have invoked the bottom-up scenario when they studied the Core condensation in heavy halo which was mentioned in the paper “ Core condensation in heavy halos: a two-stage theory for galaxy formation and clustering”.

The energy dissipation would have played a crucial role in the non-exclusive scenario of the disc galaxies formation. For this, the total mass and the angular momentum of galaxies naturally have conserved after collapsing of a primeval galaxy without any external influences. The formation of the Galaxy would have been through pure dissipationless particle, rather it formed through primordial gas, leading to the flattened disk-like structure after condensed the material within transient potential well The elegant idea

— “ the chaotic accretion of galaxies”- of Searle and Zinn (1978) is most profound and beautiful concept, which highlights the different time scale formation of the Galactic halo stars and disk stars as well. They noted that these structures were formed through disrupted and accreted dwarf galaxies, which finally accumulated into a large structure like the Milky Way with a different timescale of halo subdwarfs.

In 2000, Chiba and Beer have also clearly noted a failure of the ESL picture in the case of disk stars formation. These stars are thought to be formed through chaotic accretion process. While studying the kinematics of large metal-weak halo stars (around 1200 samples), they find the inner part of the halo is a highly flattened density distribution and the outer part of the halo is nearly spherical and, also they study the relationship between the orbital eccentricities and metallicity, but they would not find what ESL picture suggested. All structural components of the galaxies, in general, as a luminous core embedded in the dark extended halo that is much more extended than the galaxies themselves. The several lines of argument came to a single point by the end of the 1970s that the role of the dark matter is insignificant, which plays an important part in the formation scenario of galaxies.