



Lithium Production in Stars

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Why in News

Recently, scientists from the **Indian Institute of Astrophysics (IIA)** have provided evidence for the first time that **Lithium (Li) production is common among low mass Sun-like stars during their Helium (He) core burning phase.**

IIA is an **autonomous institute** of the **Department of Science and Technology (DST)**, Government of India.

Key Points

- **Findings of the Study:**

- Scientists performed a large-scale systematic investigation of the **'He-flash' (on-set of He-ignition at the star's core via violent eruption)**, at the **end of the star's core hydrogen-burning phase.**

Hydrogen burning is the fusion of hydrogen nuclei into a helium nucleus.

- This **He-flash** has been identified as the **source of Li production** suggesting that **all low-mass stars undergo Li production.**

Our **Sun** will reach this phase in about **6-7 billion years** and will manufacture Li.

- The study **challenges the long-held idea that stars only destroy lithium** and indicates that there is some physical process missing in **stellar theory.**

Earlier, it was believed that a vast majority of stars with a mass similar to that of the Sun destroy Li gradually over the course of their lives, via **low-temperature nuclear burning.**

- The study also **suggests new limits** ($A(\text{Li}) > -0.9 \sim \text{dex}$) for **classifying stars as Li-rich**, which is 250 times below the threshold ($A(\text{Li}) > 1.5 \sim \text{dex}$) used till now.

- **Origin of Lithium:**

- The origin of much of the Li can be traced to the **Big-Bang** that happened about 13.7 billion years ago.
- Over the course of time, **Li content** in the physical universe has **increased** by about a factor of four, which is **meagre compared to the rest of the elements** which grew about a million times.
- **Stars are primary contributors** to the significant enhancement of heavier elements through **mass ejections and stellar explosions**. Li, however, was thought to be an exception till now.

- **Usage of Lithium:**

- Lithium is a **light inflammable metal** which is mainly used in **lithium-ion (Li-ion) batteries** and has brought a transformation in modern communication devices and transportation.
- It is used in the **manufacturing of aircrafts**.
- It is also used in **mental health**. **Lithium carbonate** is a common treatment of bipolar disorder, helping to stabilize wild mood swings caused by the illness.

Source: PIB