भारतीय ताराभौतिकी संस्थान

INDIAN INSTITUTE OF ASTROPHYSICS

कोरमंगला Koramangala, बेंगलूरु Bengaluru – 560034.

स्नातक अध्ययन मंडल Board of Graduate Studies.

STUDENT SEMINAR
(Part of Comprehensive Examination)

Speaker: Anohita Mallick

Title: Probing Li enhancement-IR excess connection in stars close to RGB tip

सार Abstract

As stars leave the subgiant branch, lithium abundance A(Li) usually decreases because Li produced in surface layers is burnt by convective dilution. But there are giants with large Li abundance. A(Li) in some of these Li rich giants is larger than the ISM (A(Li) = 3.2) – which indicates that significant Li enrichment must have occurred in them. After the core hydrogen fusion in Main sequence stops, RGBs burn hydrogen in a spherical shell around the core. The stellar envelope expands and cools and becomes fully convective. The convection at the surface of these stars mixes the material at the surface with the internal material – known as the "first dredgeup". For low mass stars, the helium core contracts until degeneracy pressure dominates. At the tip of the RGB central temperature and density are high enough for quantum tunneling to overcome the Coulomb barrier between He nuclei, allowing the triplealpha process to begin. As the core is now degenerate, it does not expand and an explosive He consumption occurs very rapidly known as "Helium flash". The core degeneracy is lifted and He core burning initiates in these "Red Clump Stars". Kumar et al. (2020) demonstrated the A(LI) increases by a factor of ~ 40 from RGB tip to RC. So Li enhancement must occur between TRGB and RC. There are two possibilities – enhancement by merger with other stellar objects or internal nucleosynthesis in the RC stars. If the latter is true, some "extra mixing mechanism" is responsible for connecting the outer convective envelope and inner H burning shell –

1) Thermohaline mixing
2) Magnetothermohaline mixing
3) Rotation induced mixing
4) Cool Bottom Processing
5) Mass loss

For the first possibility,

1) Engulfment of closein planet(s) during the RGB phase
2) White dwarf + red giant mergers

It is still not clearly understood which of these mechanism is responsible for anomalous lithium abundances close to TRGB. We have investigated a large sample of low mass red giants on the upper red giant branch (RGB) and the red clump phase from GALAH DR3 survey. IR excess was found in some of these stars using NIR and MIR photometry implying atleast high A(Li) in some of these giants is due to mergers. We have utilized radiative transfer models using DUSTY code for all IR excess sources to estimate dust parameters. WISE band observations were used to constrain the geometrical distribution of dust shell. In addition, rotational velocities were considered to understand the massloss mechanism.

बुधवार Wedneday, 29 सितम्बर September 2021
Time: 11.00 AM
Online Meeting
सभी का स्वागत है All are welcome.

Join Zoom Meeting
https://zoom.us/j/97044707771?pwd=bXJHMVY5ZVk5LzZCakh2djk1WFlVUT09

Meeting ID: 970 4470 7771
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