LITHIUM, BERYLLIUM, BORON AS INDICATORS OF MATTER EVOLUTION

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ABSTRACT. A historic review of the 293 papers, contained as the results of observations and the description of the processes of production and destruction of the light elements Li, Be, B are presented.

Key words: Stars: abundances, evolution

The results of Li, Be, B observations are grouped in the next sections:

1. The main sequence stellar atmospheres.
1.1. The estimation of the average abundances and the study of the Li abundance slope at low temperatures.
1.2. The discovery and the study of the Boesgaard gap in the Li behaviour.
1.3. The relation between the Li abundance and the different age parameters: chromospheric activity, rotation velocity, metallicity, belong to young or old binary systems.
1.4. The evolutionary variation of Li abundance, determined by spectroscopy of the stars in the clusters with a different age.
1.5. The investigation of the Li isotopes ratio.
1.6. The Li, Be, B abundances in the atmospheres of chemically peculiar and metallic stars.
1.7. The Li abundance in the atmospheres of RS CVn type stars.
1.8. The Li abundance in the atmospheres of blue strugglers.
2. The atmospheres of high luminosity stars.
2.1. The normal subgiants, giants and supergiants.
2.2. The peculiar objects: stars with poor G-band, CH-stars, S, SC, CS, C and Ba-stars.
2.3. Lithium in the atmospheres of the giants, members of open clusters.
2.4. The Li abundance in the Magellanic Clouds.
3. The atmospheres of pre-main sequence stars.
4. The estimation of the interstellar Li, Be, B abundances.
5. The Li study in halo subdwarf atmospheres.
5.1. The independence of the Li abundance on metallicity for metal poor subdwarfs (Spite plateau).
5.2. The ratio of Li isotopes for halo subdwarf atmospheres.
6. The Be, B study in the halo subdwarf atmospheres.

The review of the processes of Li, Be, B origin and destruction is divided on the next sections:

7. The synthesis by galactic cosmic rays spallation reactions.
8. The synthesis by spallation reactions into the stellar atmospheres.
9. The synthesis into the envelope of stars and under explosions.
10. The synthesis under the neutronization processes.
11. The influence of diffusion processes on the observed abundances.
12. The burning of Li, Be, B and the mixing into envelopes.
12.1. G-dwarfs in the galactic disc.
12.2. F-dwarfs in the galactic disc.
12.3. Giants in the galactic disc.
12.4. Subdwarfs of population II and the comparison with disc populations.

13. Evolution of the Li, Be, B abundances in the Galaxy.
14. The Li, Be, B synthesis in the standard homogeneous Big Bang model.
15. A possibility of Li, Be, B synthesis for unhomogeneous models.

At the end, several details of making at 6-m telescope of spectroscopy of Li, Be doublets are briefly reported.

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PHYSICAL PARAMETERS AND CHEMICAL COMPOSITION OF COMPONENTS OF THE Am-TYPE BINARY SYSTEM RR LYNCIS

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ABSTRACT. On the basis of technique developed earlier we analysed composite spectra of the eclipsing binary RR Lyncis, which has been classified as Am-star. The following values of effective temperature were found: T_{eff}=8020±200 K for the primary component (the star A) and T_{eff}=7150±300 K for the secondary component (the star B). It was shown that the visual magnitude difference between A and B is Δm_v=-1^m.2. Using evolutionary tracks of different authors we determined the mass M of every component; mean vaiues are M_A=1.95±0.06 $M_\odot$ and M_B=1.57±0.07 $M_\odot$. These "evolutionary" masses are in good accordance with M_A and M_B values found by Kondo (1976) from an analysis of the radial velocity curves and the light curves. Both components appear to be on the main sequence and they have the age t=(1.1±0.3)·10^9 years.

Key words: Stars: Binaries, Chemical Compositions

Individual chemical composition of the components was studied; we concluded that it is peculiar for each of them. The component A displays typical features of Am-stars. Here many chemical elements show overabundance, which has a tendency to increase with atomic number Z. For the component B most of elements is in deficiency, but the trend of chemical anomalies with Z are evident, too. There is the systematic discrepancy in element abundances between B and A, which is equal to -0.6 dex on the average.

For comparison the "middle" chemical composition of RR Lyn was determined by the assumption that a single star is observed. On the whole it appears to be closer to the composition of primary component, nevertheless "middle" abundances are lovered by two times on the average relatively this component.

More detailed version of this work was published elsewhere (Lyubimkov & Rachkovskaya 1993).

References

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