[ST03] On the origin of the Super-Helium-rich population in ω Cen : AGB stars

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Recent photometric observations of stars in ω Cen have discovered a double main sequence in the color magnitude diagrams. Its bluest main sequence has been suggested to have an extremely high helium abundance of Y ~ 0.4. The same helium abundance can explain the photometric properties of stellar populations on the horizontal branch stars of ω Cen as well. This demands a relative helium-to-metal enrichment of ΔY/ΔZ ~ 70; that is, more than one order of magnitude larger than the generally accepted value. We investigate the effect of asymptotic giant branch stars, one of the suggested candidates of the origin of high helium population. We assume the AGB effect dominant system not affected by ejecta from type II supernova explosion. This model can produce the large Y~0.35 as well as ΔY/ΔZ ~ 70, but is has some difficulties in explaining the observational constraints that the CNO content is nearly constant and the mass ratio of the total mass of rMS and the that of bMS is 7:3.

[ST04] Detection of M31 Binaries via High-Cadence Pixel-Lensing Surveys

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The Angstrom Project is using a distributed network of two-meter class telescopes to conduct a high-cadence pixel-lensing survey of the bulge of the Andromeda Galaxy (M31). With the expansion of global telescope network, the detection efficiency of pixel-lensing surveys is rapidly improving. In this paper, we estimate the detection rate of binary lens events expected from high-cadence pixel-lensing surveys toward M31 such as the Angstrom Project based on detailed simulation of events and application of realistic observational conditions. Under the conservative detection criteria that only high signal-to-noise caustic-crossing events with long enough durations between caustic crossings can be firmly identified as binary lens events, we estimate that the rate would be $\Gamma_b \sim (7\text{-}15)\, f_b (N/50)$ per season, where f_b is the fraction of binaries with projected separations of $10^{-3}\text{AU} < \bar{a} < 10^{3}$ AU out of all lenses and N is the rate of stellar pixel-lensing events. We find that detected binaries would have mass ratios distributed over a wide range of $q \geq 0.1$ but with separations populated within a narrow range of 1 AU $\leq \bar{a} \leq$ 5 AU. Implementation of an alert system and subsequent follow-up observations would be important not only for the increase of the binary lens event rate but also for the characterization of lens matter.