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3. Y.N.EFREMOV, G.R.IVANOV and N.S. NIKOLOV:
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5. S.A.SILICH: On HI Shells and the Mass Spectra of OB Associations.

6. R.PENNINGTON: Star Formation in NGC 5128.

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8. C.H.B.SYBESMA: The Evolution of Massive Close Binaries with Mass Loss and Overshooting. An Application to V 729 Cyg (= BD +40 4220)

9. M.C.LORTET, M.HEYDARI-MALAYERI and G.TESTOR:
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10. D.H. MORGAN and A.R. GOOD:
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11. E.KONTIZAS, A.DAPERGOLAS and M.KONTIZAS: Bright Stars in the SMC Clusters.

12. M.KONTIZAS, M.CHRYSOVERGIS, E.KONTIZAS and D.HADJIDIMITRIOU: Tidal Radii and Masses of the Clusters in the LMC.

13. E.KONTIZAS, E.THEODOSSIOU and M.KONTIZAS: The Distribution of Bright Stars in the SMC Clusters.

14. M.KAFATOS and R.McCRAY: Propagating Star Formation Induced by Superbubbles.

15. T.GEHREN, D.HUSFELD, R.P.KUDRITZKI, P.S.CONTI and D.G. HUMMER: Non-LTE Analysis of Massive Stars in the Magellanic Clouds.

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17. E.KONTIZAS, E.XIRADAKI and M.KONTIZAS: Bright Stars in Five LMC Star Clusters.

18. G.R.IVANOV and P.Z.KUNCHEV: On the Arm Pattern of M33.

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20. H.SCHILD: The Final Fate of Massive Stars.

THE AVERAGE X-RAY LIFETIME OF MASSIVE X-RAY BINARIES

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Massive X-ray binaries may be powered by two mechanisms generating X-radiation: accretion of stellar wind material of the O-star, or Roche lobe overflow (RLOF). The evolution of RLOF powered X-ray binaries has been studied by Savonije (1978). For massive binaries the duration of the RLOF powered stage is less than 100 years for binaries evolving through case B of mass transfer, and 5000 to 10 000 years for case A. On this basis Savonije concluded that the majority of the X-ray binaries should evolve through case A of mass transfer, in order to explain the observed number of active sources in massive binaries. In this study we compute the transition from compact+O systems into X-ray binaries, with emphasis on the wind powered stage.

Evolutionary series from ZAMS to the supernova explosion have been determined by Hellings (1984) for a sample of WR+O binaries. We have calculated the effects of the supernova explosion on the pre-SN models for the binaries WR 31, 79, 97, 139 and 151, adopting the formalism for asymmetric explosions by De Cuyper (1984). The mass of the SN-remnant is taken $1.5M_{\odot}$. Just after the supernova, M(OB) = $20{\sim}27M_{\odot}$, with in their core X_c=.33~.50. The resulting compact+O binary is assumed to evolve in corotation, after synchronisation and circularisation. For systems evolving through case A, the wind powered stage, defined as the time during which the Röntgen luminosity is stronger than 10^{35} erg per second, takes about 800 000 years, before the core H burning O-star fills its Roche lobe, suffocating the X-radiation. The wind powered stage starts after the ratio semi-major axis/ radius of the OB-star, has dropped below 2.6. For the case B systems, the active stage starts during the rapid expansion during the shell H burning stage, lasting about 5000 to 8000 years. This is quantitatively a factor 100 less than for case A. Taking WR151, WR31 and WR79 representative for the classes of WR binaries separated by the conditions ($P<3$ days), ($3<P<7$ days) and ($P>7$ days), the probability for case A, including the possibility of asymmetric explosions, of these three classes is respectively : 0.621, 0.058 and 0.006. Taking into account the number of binaries in each class, the combined probability for case A is about 0.126, for case B 0.845 and for disruption 0.029. This corresponds to an average lifetime of about 10^5 years. The number of non transient massive X-ray sources within a distance of 3 kpc is 7 (Bradt,

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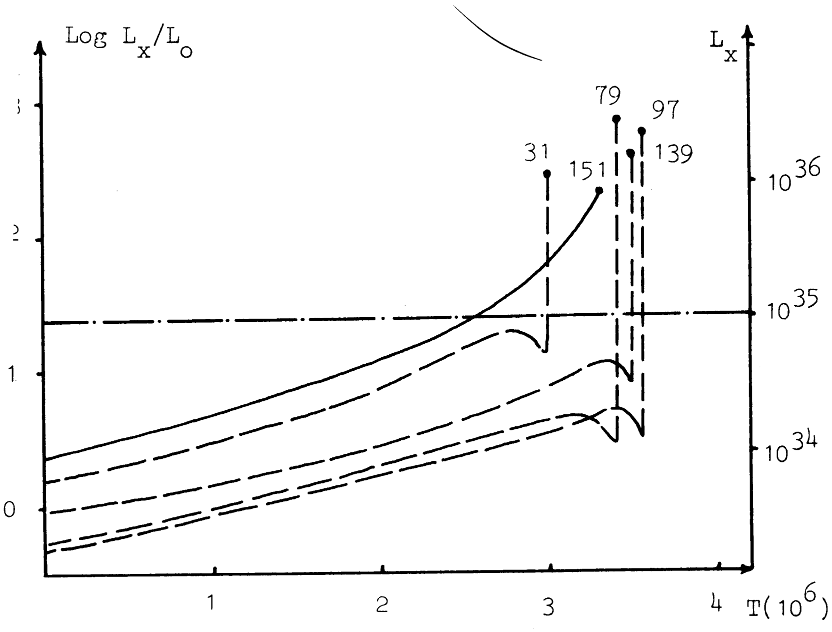

Figure 1 : The wind powered X-ray luminosity as a function of time for WR 31, 79, 97 and 139, evolving through case B (dashed lines) and for WR 151, evolving through case A (full line). The dots at the end of the tracks mark the start of RLOF.

Mc Clintock, 1983). The number of WR stars in the same volume is 50 (Hidayat et al. 1982). With a typical WR lifetime of 5 10^5 years, this corresponds to a typical X-ray lifetime of 70 000 to 140 000 years, depending on the fraction of binaries in the WR sample ranging from 0.5 to 1. The observed value is of the same order as the rough estimate obtained with the model calculations.

We conclude that the wind powered stage is an important part of the total X-ray lifetime. However, the X-ray luminosity attained during this stage never reaches 10^{37} erg/s (fig.1). During the short RLOF powered stage the sources reach a brightness of several times 10^{38} erg/s (Savonije, 1978). We also conclude that the majority of the observed X-ray binaries with optical OB component evolve indeed through case A, but that this is a selection effect of the lifetime. Against a probability for case A evolution of order 0.1 stands a lifetime 100 times larger than for case B. A complete version of this poster is submitted to A&A.

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