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VII ZW 403: A BCD WITH A NONCOEVAL STARBURST

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The recent history of star formation in VII Zw 403 is analyzed taking into account the dynamics of the starburst blown superbubble and the restrictions that follow from X-ray observations, and from our Hα data. Our results show that the starburst energizing VII Zw 403 is *not* coeval, but rather the star forming phase has lasted for more than 30 Myr and at such a low pace that most probably the newly processed metals will not be ejected into the intergalactic medium.

VII Zw403 is a BCD galaxy, in recent years considered in many discussions related to star formation histories and the possible impact of dwarf systems on the surrounding intergalactic medium. It is an isolated system, however considered to be a member of M81 group. The X-ray observations (Papaderos et al. 1994; Fourniol 1997) added more interest to the system, as they revealed an extended kpc-scale region of diffuse X-ray emission.

Several models have been investigated with the aim of matching the main observed parameters of VIIZw 403: The Hα luminosity ($L_{\mathrm{H}\alpha} = 1.8 \times 10^{39}$ erg s^{-1}), the X-ray power ($L_{\mathrm{X}} = 2.3 \times 10^{38}$ erg s^{-1}) and the size of the diffuse X-ray emitting region ($\sim$ 1 kpc). In all of them we assumed that the photons presently produced by the stellar clusters are all used up to reestablish the ionization of the central H II region. This fact is supported by the HI mass present in VIIZw 403. The Hα flux defines then the present star formation rate which we have assumed to be constant in time.

We have further assumed that the observed H I mass occupies a smooth low density halo but an important fraction of it is in a dense cloud component (M_{cl}). This has a major impact on the evolution as it affects both the time required to reach a given size as well as the X-ray luminosity produced by the superbubble.

The calculations were carried out with our 3D Lagrangian code, which accounts for the enrichment of the hot superbubble interior by the metals ejected via supernova explosions (Silich et al. 2001). The results from the calculations (see Fig. 1) imply that:

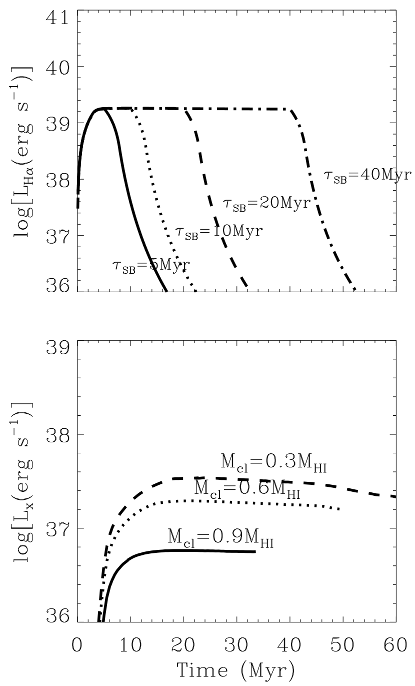

Fig. 1. (a) The calculated central star cluster Hα luminosity for starburst of different durations. (b) Bubble X-ray emission for different mass fractions in the assumed cloud component as functions of time.

- The starburst energizing VII Zw 403 is *not* an instantaneous or coeval star cluster.
- The starburst formation time is larger than 30Myr. This is also the time span required for the starburst blown superbubble to reach the dimension and luminosity of the extended X-ray component, while producing the observed Hα luminosity.
- During that time star formation has proceeded at an almost constant rate SFR $= 4 \times 10^{-3} M_{\odot}$ yr^{-1}.
- The combination of the various parameters used to produce the *best* model imply that the newly processed metals in VII Zw 403 will not be ejected into the intergalactic medium.

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