

An unusual bubble in the tidal arm of NGC 7318B in Stephan's Quintet

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Abstract. We optically find an unusual emission-line bubble near the tip of the southeastern arm of NGC 7318B. A large number ($\sim 10^6$) of supernova remnants would be the most plausible agents.

NGC 7318B in Stephan's Quintet has two optical arms (toward N and S), emanating from the eastern part of the main body. Since these arms are similar morphologically to the tidal tails of merging galaxies such as NGC 4038/9, it is considered that NGC 7318B itself is a major merger with a retrograde orbit. Because the radio and the soft X-ray emission is associated to the arm (van der Hulst & Rots 1981; Pietsch *et al.* 1997), it is of importance to study its optical emission-line activity.

Our new CCD narrow-band $H\alpha$ imaging shows a large-scale arc in $H\alpha$ emission which traces closely the arms. This $H\alpha$ arc resembles both the radio and the soft X-ray arcs morphologically, suggesting that a single physical mechanism is responsible for all these kinds of emission. Our optical spectroscopic observations of the shell-like feature at the southern tip of the arc reveal both broad $H\alpha$ emission and stronger-than-normal [NII] and [SII] emission lines, which are typical of the supernova remnants. The required number of SNRs is estimated to be as large as $\sim 10^6$.

The proposed scenario for the arc formation is the following (Ohyama *et al.* 1997). The two tidal tails were formed during the past merging event between two gas-rich disk galaxies. Giant H II regions containing numerous massive stars ($\sim 10^6$) were formed almost simultaneously along the tails (*e.g.*, Barnes & Hernquist 1992). After $\sim 10^{6-7}$ years, supernovae exploded almost simultaneously and formed the emission arc observed in $H\alpha$, radio, and soft X ray.

References

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