

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

Y. Ohyama, S. Nishiura, T. Murayama, and Y. Taniguchi

*Astronomical Institute, Tohoku University,  
Aramaki, Aoba, Sendai 980-8578, JAPAN*

**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**

- Barnes, J.E., Hernquist, L. 1992, *Nature* 360, 715  
van der Hulst, J.M., Rots, A.H. 1981, *AJ* 86, 1775  
Ohyama, Y., Nishiura, S., Murayama, T., Taniguchi, Y. 1998, *ApJ* 492, L25  
Pietsch, W., Trinchieri, G., Arp, H., Sulentic, J.W. 1997, *A&A* 322, 89