TRI-DIMENSIONAL OBSERVATION OF THE SUPERBUBBLE IN THE STARBURST GALAXY NGC 2782

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Abstract.

We present results of an optical tri-dimensional observation of the central $2' \times 12''$ region of the starburst galaxy NGC 2782. The circumnuclear Hα emission lines consist of broad ($\delta v \sim 300$ km s^{-1}), blue-shifted component and narrow ($\delta v < 100$ km s^{-1}) component and we first revealed the two-dimensional spatial distribution of those two components. The broad Hα emitting region is extended to $6''$ (> 1 kpc) south from the nucleus and the emission-line ratios indicates that shock heating may be the main excitation mechanism of the ionized gas in the region. We conclude that this region is a superbubble outflowing from the nuclear starburst region.

1. Introduction

NGC 2782 (Arp 215) is a nearby starburst galaxy (cz = 2562 km s^{-1}, m_V = 12.6 mag.). It has an large optical tidal tail in the east side and many ripple- or arc-like structures around the main body. There is a candidate of a very young, possibly forming dwarf galaxy at the root of the tidal tail (Yoshida et al. 1994, PASJ, 46, L195). A huge HI tail is extended up to 100 kpc toward the north-west of NGC 2782 (Smith 1991, ApJ, 378, 39). These properties suggests that NGC 2782 is a galaxy-galaxy merging system and the merger phenomenon triggered its star forming activity.

2. Observations

Observations were carried out with a slit-scanning type tri-dimensional spectroscopic system, Spectro-Nebulargraph (SNG: Kosugi et al. 1995, PASP,

Y. Sofue (ed.), The Central Regions of the Galaxy and Galaxies, 151-152.

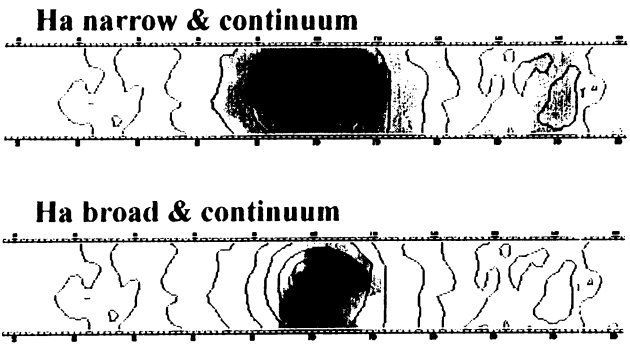

Figure 1. The narrow Hα and broad Hα line images of NGC 2782.

107, 474) of Okayama Astrophysical Observatory in February 1995. We scanned the central $5' \times 12''$ region of NGC 2782 with 7 slit positions with the spectral resolution of 2000. The spectral range covered was 6000Å-7000Å, including [O I]λ6300, Hα + [N II]$\lambda\lambda$6548, 6584, [S II]$\lambda\lambda$6717, 6731. Seeing at the observing night was around $2''$.

3. Results

The profiles of the Hα emission-lines around the nucleus could not be fitted by single Gaussian functions. We decomposed the circumnuclear Hα lines into two components: the broad ($\delta v > 300$ km s^{-1}), blue-shifted component and the narrow ($\delta v < 100$ km s^{-1}) component and first revealed the spatial distributions of those two components (Fig.1). The broad Hα line region is extended to the south from the nucleus and closely resembles the [O I] emitting region in morphology. The position angle of the broad Hα line region is coincident with the PA of the 20cm radio continuum map presented by Condon et al. (1982, ApJ, 252, 102). The morphology of the narrow Hα line region is flatter than that of the total Hα image and the position of the intensity peak is slightly shifted to north-east from the nucleus (Fig.1).

The broad Hα line gas near the nucleus has the same velocity as the systemic one. South of the nucleus, the broad line gas is blueshifted with respect to the narrow Hα gas and that blueshift increases with radius. The kinematics, the morphology and the gas excitation of the broad Hα region mentioned above strongly imply that *this region is a starburst superbubble expanding outward from the nuclear starburst region* (= the central narrow Hα region) of NGC 2782 and its gas is ionized by shocks driven into clouds accelerated by the superbubble. We first succeeded in separating the superbubble which was suggested by Boer et al. (1992, A&A, 260, 67) from the disk starforming region of NGC 2782 and imaging it.