R41a Spectroscopic Evidence for the Young Superwind in the Starburst Galaxy NGC 2782

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We report on both the kinematical and excitation properties of the ionized gas in the nuclear starburst region of NGC 2782, based on our new optical tri-dimensional observations of the central $2' \times 18''$ region of this galaxy. The emission line profiles cannot be described as a single Gaussian component in most parts of the observed area. We then find that they can be well decomposed into two kinematical distinct components; a broad ($FWHM \sim 500$ km s^{-1}) and a narrow ($FWHM \lesssim 150$ km s^{-1}) components. The broad component is associated spatially with the nucleus and the southern extension while the narrow component is mostly with the northern arc-like region. The kinematical properties obtained in this study show that the arc-like region is a part of the circumnuclear rotating ring. The emission-line intensity ratios of the narrow component is consistent with those of H II regions. On the other hand, shock heating is the most viable excitation mechanism for the broad component emission. In particular, the outer part of the broad component emitting region has a higher electron density than the inner parts and the highest velocity dispersion. Since these properties can be interpreted in terms of shock compression, the superwind in NGC 2782 is still interacting with the interstellar medium in this galaxy. The overall morphology of the broad component region is quite similar to those of the published 5 GHz radio continuum maps. All these findings strongly suggest that the broad component region is the shell of a pair of bubbles driven by the galactic scale outflow from the nuclear starburst region surrounded by the circumnuclear rotating star-forming ring although we are seeing only the southern bubble and the northern rotating ring because of the heavy extinction.