High surface brightness blue galaxies have been a curiosity in samples of nearby galaxies for more than 40 years (e.g., Zwicky 1957; Sandage 1963). While these types of compact galaxies were often excluded from traditional samples of galaxies that chose objects on the basis of angular size (see Arp 1966), they can be found readily in surveys that select for blue colors or strong optical emission lines. Follow-up studies to the Markarian survey, for example, have shown that these high surface brightness galaxies consist of systems with active galactic nuclei (AGNs) and/or with extraordinarily high star formation rates (SFRs), i.e., the starburst galaxies (e.g., Sargent 1970; Huchra 1977). Recently, interest in blue high SFR galaxies has been stimulated by the spectroscopic and morphological similarities to classes of galaxies commonly found at high redshifts (see Gallagher, Hunter, & Bushouse 1989; Gallagher 1990; Cowie, Hu, & Songalia 1995; Ellis 1997; Guzman et al. 1998). Hence, studying nearby starbursts can further our understanding of rapidly evolving galaxies observed at moderate to large look-back times.

High surface brightness starburst galaxies with blue optical colors make up about 5% of the local galaxy field population with optical luminosities of $L_B \approx 3 \times 10^9 L_\odot$ (e.g., Huchra 1977). The origins, structures, and evolution of these luminous blue galaxies (LBGs), however, are not well understood. We therefore have undertaken a new study of nearby LBGs with the objectives of obtaining better information on their structures, characterizing spatial patterns of star formation, and measuring internal kinematics. The dynamics of these systems are particularly important for predicting their subsequent evolution. Many of these galaxies are optically peculiar at the moment we see them because of enhanced SFRs, but their appearance at later times may be determined by the present locations and kinematics of their stars and gas, which in turn influence future star formation processes.
star formation within the clumps deduced by Heidmann and collaborators was confirmed by Gallego et al. (1996); their data indicate that \( L(Hz) \) for the three largest clumps is 2–8 \( \times 10^9 \) \( L_\odot \). These are each comparable to the total \( L(Hz) \) seen in many starburst galaxy nuclei.

Emission-line kinematics were measured in NGC 7673 by Duflot-Augarde & Alloin (1982, hereafter DA), who found a remarkably constant velocity across the galaxy. The lack of internal velocity spread led DA to conclude that NGC 7673 is rather quiescent, and they therefore rejected a merger model but noted that an interaction with its neighbor, NGC 7677 (Mrk 326) at a similar radial velocity (3554 vs. 3405 km s\(^{-1}\)) for the three largest clumps is 2–8 \( \times 10^9 \) \( L_\odot \). These are each comparable to the total \( L(Hz) \) seen in many starburst galaxy nuclei.

Emission-line kinematics were measured in NGC 7673 by Heidmann (2005) and is at nearly its radial velocity. Thus while an interaction

Our observations and reductions are detailed in § 2. Section 3 presents results that are discussed in § 4, while § 5 contains a summary and conclusions.

3. OBSERVATIONS AND REDUCTIONS

All observations were made with the WIYN 3.5 m, f/6.5 telescope at the Kitt Peak National Observatory. All data reduction was performed with IRAF.\(^4\)

3.1. Optical Imaging

Images were obtained using a Tektronics 2048 \( \times \) 2048 pixel CCD with a field of 6.7 \( \times \) 6.7 and a scale of 0.195 pixel\(^{-1}\). On 1996 November 13, a 500 s exposure was taken with a Harris R filter along with a 700 s exposure with a Harris B filter. The images were corrected for bias and zero level and flat- fielded with the “ccdproc” task; cosmic rays were not removed. The seeing in these images is 0.8″.

Narrow band imaging was undertaken on 1997 July 24, a nonphotometric night with moderately poor seeing. We were able to get two exposures taken with a redshifted Hz filter: 1000 s and 631 s (cloud-dodging) and a 300 s exposure taken with a Harris R filter. The redshifted Hz filter is centered at 6618 Å and has a width of 72 Å. Thus our Hz narrowband images also include emission from [N II].

These Hz and R images were processed in the same way as the earlier data, except that we removed cosmic rays from the pair of narrowband images. Both the combined Hz and R image were scaled in such a way that subtracting the Hz image from the combined Hz image canceled out field stars, thus producing a continuum-subtracted Hz image. The seeing in this final Hz image is about 1.4″.

3.2. DensePak Optical Spectroscopy

On 1997 October 23, two 1500 s exposures were taken with the fiber array DensePak (see Barden, Sawyer, & Hon eycutt 1998) on the WIYN Nasmyth port. DensePak is a fixed array of 91 red-optimized fibers arranged in a 13 \( \times \) 13 rectangle. Each fiber has a 3″ diameter, and the fiber centers are each separated by 4″ to form a 30″ \( \times \) 45″ array. The fiber feed cables the Bench Spectrograph, which for these observations was configured with a 316 line mm\(^{-1}\) echelle grating and a gratings angle of 62.5°. We used the Bench Spectrograph camera and the 2048 \( \times \) 2048 T2K CCD detector with a 24 μm pixel\(^{-1}\), for a wavelength coverage of approximately 6300–6730 Å with a reciprocal dispersion of 0.13 Å per CCD pixel.

A DensePak schematic is shown in Figure 1. There are four fibers placed off the corners of the array—numbers 8, 9, 10, and 21 cm line by Nordgren et al. (1997), who find an H I mass of 3.6 \( \pm 0.5 \) \( \times 10^9 \) \( M_\odot \) for NGC 7673. Both galaxies contain extended H I disks; NGC 7673 is apparently nearly face-on with a modest H I asymmetry to the west. NGC 7677 contains a small outer H I irregularity that points toward its neighbor and is at nearly its radial velocity. Thus while an interaction

\(^3\) The NASA/IPAC Extragalactic Database (NED) is operated by the Jet Propulsion Laboratory, California Institute of Technology, under contract with NASA.

\(^4\) IRAF is provided by the courtesy of the National Optical Observatories, which are operated by the Association of Universities for Research in Astronomy, Inc., under cooperative agreement with the US National Science Foundation.
32, 68, and 90. We were able to use these for the intended purpose of sky subtraction because these fibers were not covering the H\textalpha-emitting regions of the galaxy, so we did not have to move the telescope for a separate sky exposure. Also note the gaps in numbering; 23 and 28 have been skipped. Fibers 46 and 59 are dead.

Bisect frames and dome flats were taken at the beginning and end of the night and combined during reduction with the IRAF task “dohydra.” For wavelength calibration, comparison spectra were taken with a ThAr lamp after each exposure. The four spectra from the sky fibers were combined to make a single sky spectrum and subtracted from each of the other fibers as part of the “dohydra” procedure. Combining the two final zeroed, flat-fielded, sky-subtracted spectra was accomplished with “scombine” with reject = “crreject” to remove cosmic rays.

To estimate the error in our measurements, Gaussian profiles were fitted to the night-sky lines in the combined sky spectrum with the IRAF task “splot.” The observed wavelength of the H\textalpha line is close to 6638 Å over the entire galaxy, so comparison night-sky lines were chosen near this wavelength. The FWHM resolution determined in this way is 32 km s$^{-1}$. The statistical uncertainty in central wavelength for a bright sky line refers to the scatter about the absolute wavelength and is $\leq 0.05$ Å, which corresponds to 2.3 km s$^{-1}$ at 6638 Å. However, in some cases the complex profiles or low signal-to-noise ratios (S/N) of the H\textalpha emission lines makes the determination of accurate radial velocities difficult, thus yielding a greater uncertainty.

Gaussian emission profiles were assumed and fitting done with the IRAF task “splot.”

4. RESULTS

4.1. Imaging

The deep R-band image is shown in Figure 2 (upper right); an unsharp mask of the same image is also shown in Figure 2 (upper left). Surrounding the bright central disk of NGC 7673 are several wispy, low-surface brightness features. In Figure 2 (upper left), one can see a broad “bridge” extending to the northwest connecting the inner disk to the first arc at 36° (8 kpc) from the galaxy center. The next arc, or ripple, can be seen in Figure 2 (upper right), located to the east at 52° (11.5 kpc) from the center. The most striking ripple is located to the west at 1:55 (21 kpc) from the center of the bright optical disk. This sharply defined arc was first reported by Dettmar et al. (1984), who suggested this feature could be either stars or an emission-line region. In Figure 2 (upper left), there are several extensions to the main disk, most noticeably two on the eastern edge and one in the southwest corner. The linear feature north of NGC 7673 is a background galaxy, which is confirmed by its extreme redness in the $B-R$ image and the Gallagher et al. (1999) WFPC2 images.

The R-band image is shown again in Figure 2 (lower left), with a stretch that shows the structure of the inner disk, including the central bar. That the light gray smudge in the southeast corner is a background galaxy is confirmed from its $B-R$ color and the WFPC2 images which reveal it to be a distant (and beautiful) spiral galaxy. A $B-R$ color map is shown in Figure 2 (lower right). The $B$ and $R$ images have not been photometrically calibrated, so the color map is a $B/R$ ratio map after standard reduction and sky subtraction. The spiral nature of the inner disk is clearly visible; there are prominent red dust lanes and bright blue clusters in this image. Unfortunately, we were not able to get color information on the outer ripples; they are too faint for reliable color measurements from these data. However, the ripples are present in both $B$ and $R$ images with comparable intensities, indicating that they are composed of stars.

A continuum-subtracted H\textalpha image is shown in Figure 3. There are three main H II regions: the central “nucleus,” the large clump to the northeast, and a smaller clump situated between the two. These correspond to clumps A, B, and C, respectively, as referred to by DA and Taniguchi & Tamura (1987). In the southeast corner there is a fainter H \textalpha ring, where it is possible to identify smaller H II regions. A bright cluster of stars seen in the $B$- and $R$-band images is located on the northern side of this crooked “arm,” nestled between edges of ionized gas visible in the H\textalpha image. The gas directly between us and the cluster does not appear in the H\textalpha image, but the gas in the surrounding galaxy plane is brightly lit. The diffuse outer features are not detected in our narrowband H\textalpha image, which is consistent with our interpretation that they are starlight.

4.2. Spectroscopy

We performed a kinematic study of NGC 7673 using the DensePak fiber array and the H\textalpha emission line redshifted to near 6638 Å. To find fiber placement on the galaxy, the narrowband H\textalpha image (Fig. 3) is compared with the DensePak map with flux in gray scale, shown in Figure 4. The approximate placement of the DensePak array is marked with a box in Figure 3. Figure 4 was produced with the IRAF task “sbands,” taking the flux in a 10 Å wide band centered on 6638 Å and using 6 Å wide bands to the blue and red for continuum subtraction. The fiber diameter of 3" covers a linear distance of approximately 650 pc at NGC 7673, but we were not able to cover all of the main body of the galaxy with our single DensePak pointing.

4.2.1. Emission Profiles

No emission was detected in 29 of the 89 working fibers; the fiber illumination pattern is consistent with our H\textalpha image. Of the remaining 60 fibers, 32 had emission fit by a single Gaussian profile, and 28 were deconvolved into two Gaussian profiles, one broad and one narrow. It became clear that deconvolution was necessary when a single-component fit left large, broad, asymmetric shoulders of emission; most of these broad lines are found in the northern half of the galaxy. Sample spectra are displayed in Figure 5.

Fibers on the southern part of the galaxy were fit by a single Gaussian profile, but in most cases small shoulders, or wings, of emission often remained. These wings are similar in shape to those in the middle of the array but much less pronounced. Even in spectra with similar peak emission, the wings were smaller in the southern part of the galaxy. A deconvolution of these spectra into two components improved the fit, but resulted in one or both of the components having a FWHM at or below the instrumental resolution. Therefore, these spectra were fit with a single Gaussian profile. Figure 6 is a plot of FWHM, corrected for the instrumental profile $[\text{FWHM}^2 = (\text{FWHM}_{\text{obs}})^2 - (32 \ \text{km s}^{-1})^2], \text{versus position}$, which shows the distinct widths of the two components and some scatter but no systematic variation greater than 10 km s$^{-1}$ in the FWHM of the narrow emission component over the galaxy.
Some spectra show what appear to be multiple peaks, which may have been caused by emission from two or more individual H II regions or by splitting from expanding shells or bubbles. Since most of these spectra have low S/N, a single Gaussian fit was forced to recover a mean central velocity and a FWHM of dubious meaning. Such profiles were observed in 12 fibers; six had FWHMs consistent with the narrow component, and six had FWHM $> 90$ km s$^{-1}$.

4.2.2. Velocity Field

The velocity field as measured by the heliocentric velocities of the narrow components is shown in Figure 7, where the velocity is in km s$^{-1}$ and gray-scale shading is used to help visualize the velocity field. Filled polygons indicate spectra with no narrow emission component. Fibers with broad emission but not narrow are thus represented by
We find the narrow component velocity field to be fairly constant, with a radial velocity difference of only \(~60\) km s\(^{-1}\) across the galaxy regions covered by DensePak (the western side of the galaxy was not sampled). The maximum velocity is \(3444\) km s\(^{-1}\) in the southwest corner, and falls to \(3403\) km s\(^{-1}\) at the northern edge. The minimum, \(3392\) km s\(^{-1}\), occurs near the nuclear region, and the recession velocity of the nucleus itself is \(3407\) km s\(^{-1}\). These results agree with previous measurements by DA. This also agrees with the H\textsc{i} data (Nordgren et al. 1997), which shows the peak emission to be at a heliocentric velocity of \(3410\) km s\(^{-1}\). The precision of the DensePak absolute radial velocities is similar to that obtained from H\textsc{i} 21 cm line measurements.

The shallow velocity gradient across NGC 7673 indicates that the H\textsc{ii} regions are confined to a dynamically cold rotating disk that is nearly face-on. The optical and H\textsc{i} morphology of NGC 7673 also suggest the presence of a disk, the existence of which is confirmed by these emission-line measurements that show rotation about its barred nuclear region. Although the disk shows signs of perturbation, such as copious star formation and a disturbed spiral pattern, it has survived the event that triggered the starburst and appears to be rotating smoothly.

The velocity gradient measured by optical emission lines (here, and by DA), although modest owing to a small angle of inclination, differs from that of the H\textsc{i} disk (Nordgren et al. 1997). The western edge of the optical disk is approaching and the eastern receding, but the H\textsc{i} velocity gradient is in the opposite sense. This may be a signature that moderate-scale kinematic disturbances remain in the disk of NGC 7673, and high angular resolution H\textsc{i} maps would provide a useful diagnostic of the state of this galaxy.

5. DISCUSSION

5.1. Kinematics

In regions of low flux, the emission-line profiles are usually Gaussian in shape; however, as previously mentioned, 12 fibers contain spectra with large asymmetries. Over the central regions of the galaxy where the flux is highest, we find H\textsc{ii} emission lines with a relatively narrow core and broad wings—very similar to the integrated profiles of giant H\textsc{ii} regions found in many previous studies.
FIG. 4.—DensePak map, flux in gray scale. Fiber 39 is marked for orientation. North is up, and east is to the left.

(Smith & Weedman 1970; Gallagher & Hunter 1983; Skillman & Balick 1984; Arsenault & Roy 1986; Roy, Arsenault, & Joncas 1986; Arsenault & Roy 1988; Mendez & Esteban 1997; Rozas et al. 1998). Some of these emission lines are well fitted by a Voigt profile, but most have asymmetric shoulders, and thus are best fit with two Gaussian components. We therefore assume that the emission-line profiles that resemble a Voigt profile are a combination of two Gaussian components with negligible velocity offset and fit all such profiles with two Gaussians, leaving the central wavelengths and line widths free to vary. Taking the emission component(s) in each fiber, we find the mean FWHM of each kinematic component is 56 and 149 km s\(^{-1}\), respectively (\(\sigma \approx 24\) km s\(^{-1}\), \(\sigma \approx 63\) km s\(^{-1}\)). Fibers with emission lines fitted with two profiles are marked with a small cross in Figure 7. Most of the broad components are at a slightly lower velocity relative to the narrow line in the same spectrum but never by more than 10 km s\(^{-1}\). Taniguchi & Tamura (1987) also found a narrow and a broad component in the H\(\alpha\) emission line from clump B; they measured the broad component as having a FWHM > 200 km s\(^{-1}\), and found it was redshifted by 13 km s\(^{-1}\) relative to the narrow component of FWHM \(\sim 70\) km s\(^{-1}\).

The mean FWHM of the narrow component is much broader than emission from typical H\(\Pi\) regions in our own Galaxy (typical FWHM \(\sim 25\) km s\(^{-1}\); see Münch 1958; Fich, Treffers, & Dahl 1990). The origin of ionized gas with supersonic velocity dispersions is still a subject of debate and, thus, a generally accepted model for this phenomenon does not yet exist. An \(L-\sigma\) (luminosity–velocity dispersion) and \(D-\sigma\) (size–velocity dispersion) correlation for giant H\(\Pi\) regions has been firmly established (see Melnick 1977; Terlevich & Melnick 1981; Arsenault & Roy 1988), but it is still not clear what this relationship means. \(L\) and \(D\) should correlate with mass; therefore one expects the velocity dispersion also to increase. However, the energy input to the interstellar medium in the form of ionizing photons, stellar winds, and supernovae should also correlate with \(L\) and \(D\).
increasing the amount of ionized structure (expanding shells, filaments, etc.) and turbulent motions, both of which may broaden the integrated emission profiles.

There is evidence that apertures that include multiple ionized structures at various velocities can create a smooth Gaussian profile with a broadened core (Chu & Kennicutt 1994; Yang et al. 1996). In a study of NGC 604, the brightest H II region in M33, Yang et al. (1996) showed that although some of the broadening in the integrated profile is caused by averaging over many emitting regions, the mean corrected FWHM still shows a substantial velocity dispersion above that expected from purely thermal broadening. They concluded that the extra 30 km s$^{-1}$ could be explained as virial motions. This is in contrast to the case of the 30 Doradus giant H II region as examined by Chu & Kennicutt (1994), where even a 10-fold increase in the estimated mass of the region yielded a gravitational velocity dispersion that was negligible in comparison with the observed dispersion. In this case, the conclusion was that the dominant contribution to the global velocity dispersion in 30 Dor is from shell motions but with turbulence also playing a role.

It is not clear what is causing the width of the narrow emission cores in the case of NGC 7673. If it is the result of gravitational motions, we should expect to see wider lines in connection with the more massive H II regions as shown in the Hα image. Broadening owing to averaging over many bubbles and filaments should also produce a spatial variation in the line widths, as some fibers cover a greater number of H II regions than others. Given the low spatial resolution of our observations and the uncertainty in fiber placement, we cannot rule out either of these possibilities. The observed scatter of approximately 10 km s$^{-1}$ in the total FWHM about the mean value implies an extra velocity component of width $\sim 35$ km s$^{-1}$ (FWHM, or $\sigma \sim 15$ km s$^{-1}$) is possible.

We also see a broad emission component underlying the (relatively) narrow cores, which have been previously observed in Hα emission lines but are not well understood. Broadened cores produced by averaging over many emitting areas have been found accompanied by low-intensity wings (Chu & Kennicutt 1994), presumably from expanding shells and bubbles. The recent study of NGC 604 (Yang et al. 1996) also showed broad wings in the integrated profiles—again, from the inclusion of many expanding shells. It would be interesting to see if these integrated profiles can be deconvolved into narrow and broad components and how the width and/or shape of the lines change as one averages over a larger area.

There are three leading explanations for the broad wings: they may be the result of integrating over many ionized structures at different velocities; or a broad emission com-
component may be present from hot, turbulent gas confined to large cavities carved out by massive stars; or they could be caused by some type of break-out phenomenon, such as a champagne-flow or a starburst-powered galactic wind.

A massive outflow phenomenon is highly unlikely because of the absence of double-peaked emission profiles and/or a substantial velocity offset between the narrow and broad components, both of which are characteristic of superwinds (Heckman, Armus, & Miley 1990; Lehnert & Heckman 1996). This leaves us with the first two explanations listed above. Given the results of the studies by Chu & Kenicutt (1994) and Yang et al. (1996), we favor the first explanation, where the line profiles are the result of integrating over many shells, bubbles, and filaments, which can also explain the highly supersonic line widths of the narrow component.

### 5.2. Starburst Trigger

NGC 7673 is a close projected companion to NGC 7677, which has a similar radial velocity; therefore, these two galaxies are probably a physical pair (Casini & Heidmann 1976; Nordgren et al. 1997). The surrounding area is free of small H I sources. A few minor appendages to the main disk of NGC 7673 are seen in the low-resolution H I map of Nordgren et al. (1997), but there is an absence of classic interaction signatures, such as H I tails. Given the disturbed optical appearance of NGC 7673, its overall H I morphology is surprisingly symmetric. No H I peculiarities near the location of the outer optical shell were detected, although this may be due to the low resolution of the H I map. As mentioned previously, there is a warp in the disk of NGC 7677 and an H I extension pointing toward NGC 7673, but the outer H I envelopes are widely separat-

ed. The H I structure in these galaxies displays no indications of a significant ongoing interaction between the two; any serious interaction would need to have taken place long enough ago for the outer H I disks to recover to their observed relatively normal states.

The discrepancy between the morphology of NGC 7673 and NGC 7677 is apparent on the Digitized Sky Survey frames; NGC 7677 looks relatively regular, with a bright nuclear region and grand design spiral arms, in dramatic contrast to NGC 7673, in which high levels of star formation create giant H II regions and a remarkably clumpy appearance. If the starburst in NGC 7673 is due to an interaction with NGC 7677, then the interaction scenario must be able to explain why NGC 7673 is so disturbed and NGC 7677 relatively unscathed. We conclude that an ongoing interaction with NGC 7677 is not the starburst trigger. Even though no strong collision is currently in progress between NGC 7673 and NGC 7677, the disturbed outer optical disk of NGC 7673 does seem to be the signature of a past interaction.

The sharp outermost arc, along with the wispy extensions and faint ripples that surround the bright inner optical disk, are features usually associated with merger candidate E, S0,
and a few Sa galaxies (Schweizer & Seitzer 1988). These structures are rare in later type galaxies but have also been found around another spiral starburst galaxy, NGC 3310 (Mulder & van Driel 1996). There are striking similarities between NGC 7673 and NGC 3310. They are both starburst galaxies with inner spiral structure surrounded by faint arcs and ripples, and their Hβ emission lines are strong and asymmetric (Grothues & Schmidt-Kaler 1991). The general consensus is that NGC 3310 has gone through a minor merger with a dwarf companion, which accounts for the starburst, peculiar arc, and ripple features in its outer parts (Grothues & Schmidt-Kaler 1991; Mulder & van Driel 1996; Smith et al. 1996; Mulder, van Driel, & Braine 1995; Kikumoto et al. 1993). The minor merger model therefore is also attractive for NGC 7673.

Theoretical work concerning ripples and “shells” around galaxies has shown that they can be formed in a variety of circumstances around both elliptical and disk galaxies (Quinn 1984; Wallin & Struck-Marcell 1988; Hernquist & Quinn 1989; Hernquist & Spergel 1992; Howard et al. 1993). Observationally, it is often difficult to distinguish between the models, and thus the origin of ripples in any particular object is often a subject of debate. Consequently, while mergers are the preferred model for the production of ripples and related features, their origin in other types of interactions cannot be excluded.

We therefore have two possible models: the NGC 7673 starburst could have been triggered by a past interaction with NGC 7677 that occurred long enough ago that any tidal streamers are gone, or a small galaxy could have merged with NGC 7673 in the past and the nearby presence of NGC 7677 is simply fortuitous. In either case, the collisional event must have occurred long enough ago to allow the outer disk to mostly recover, and it must have been mild enough to avoid serious disruption of the main disk. Any interloper therefore must have been much smaller than the accreting galaxy, probably less than 10% of the mass of the disk (Hernquist & Mihos 1995; Mihos & Hernquist 1994; Walker, Mihos, & Hernquist 1996), thereby making NGC 7673 a minor merger candidate.

6. SUMMARY AND CONCLUSIONS

We have obtained moderate-resolution optical images and echelle spectroscopy of the luminous blue galaxy NGC 7673. Our B - R color map shows red dust lanes and blue star clusters in an irregular spiral pattern, and the Hβ image confirms that these bright clusters are also giant H II regions. The deep B- and R-band images confirm the presence of the previously reported ripple 1'55 west of the galaxy center (Dettmar et al. 1984), as well as reveal several other faint extensions and ripples surrounding the bright optical disk. These features are composed of stars, probably in the outer disk of NGC 7673.

Our fiber array measurements of the Hz kinematics demonstrate that the H II regions are embedded in a smoothly rotating disk that we are viewing near a rotation- al pole. Despite the presence of a large-scale starburst, the disk velocity field appears to be remarkably regular. In areas of low flux, the emission profiles are often highly asymmetric and are not well described by a single Gaussian profile. We may be seeing line-splitting from isolated ionized supershells, or the lines may be a combination of two or more HII regions with different radial velocities. Double Gaussian fits were performed on emission lines from the central regions of the galaxy to investigate the nature of the broad wings of emission. We find that a two-component model, one narrow and one broad, fits the observed spectra rather well. The narrow component of complex emission-line profiles have the same width as the single component lines, FWHM ~ 55 km s⁻¹, and the broad component has a FWHM ~ 150 km s⁻¹. The broad lines often have a slight velocity offset (<10 km s⁻¹), blue-ward of the narrow lines.

We can exclude an active interaction with NGC 7677 as the starburst trigger, but we cannot rule out a past interaction. If NGC 7677 is the culprit, then the starburst phase must be sustained well after the main encounter. The other possibility is the capture of a dwarf companion, as in the case of NGC 3310, which is the leading candidate for a major starburst induced by a minor merger. The morphological similarities between NGC 7673 and NGC 3310 and NGC 7673's symmetric outer H I disk (Nordgren et al. 1997) lend support to the minor merger hypothesis. High-resolution H I observations may resolve this issue.

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REFERENCES

Arp, H., 1966, ApJS, 14, 1
Asensio, R., & Roy, J.-R. 1986, AJ, 92, 567
Barden, S., Sawyer, D., & Honeycutt, R. 1998, Proc. SPIE, 3355, 892
Benvenuti, P., Casini, C., & Heidmann, J. 1982, MNRAS, 198, 825
Börngen, F., & Kalloglian, A. 1975, ApJ, 11, 24
Casini, C., & Heidmann, J. 1976, A&A, 47, 371
Chu, Y., & Kennicutt, R. 1994, ApJ, 425, 720
Coudret, G., Heesen, J., & Heinemann, J. 1982, MNRAS, 199, 451
Cowie, L., Hu, E., & Songalia, A. 1995, AJ, 110, 157
Dettmar, R., Heidmann, J., Klein, U., & Wielebinski, R. 1984, A&A, 130, 424
de Vaucouleurs, G., de Vaucouleurs, A., & Corwin, H. 1976, Second Reference Catalogue of Bright Galaxies (Austin: Univ. of Texas Press) (RC2)
Duflot-Augarde, R., & Alloin, D. 1982, A&A, 112, 257 (DA)
Ellis, R. 1997, ARA&A, 35, 389
Fich, M., Treffers, R., & Dahll, G. 1990, AJ, 99, 622
Gallagher, J. 1990, in ASP Conf. Ser. 10, Evolution of the Universe of Galaxies, ed. R. G. Kron (San Francisco: ASP), 157
Gallagher, J., & Hunter, D. 1983, ApJ, 274, 141
Gallagher, J., Hunter, D., & Bushouse, H. 1989, AJ, 97, 700
Gallagher, J., Homeier, N., Griffiths, R., & WFPC2 Investigative Definition Team 1999, in preparation
Gallego, J., Zamorano, J., Rego, M., Alonso, O., & Vitories, A. G. 1996, A&R, 120, 323
Grothues, H., & Schmidt-Kaler, Th. 1991, A&A, 242, 357
Guzman, R., Jangren, A., Koo, D., Bershady, M., & Simard, L. 1998, ApJ, 495, L13
Heckman, T., Armus, L., & Miley, G. 1990, ApJS, 74, 833
Hernquist, L., & Mihos, J. 1995, ApJ, 448, 41
Hernquist, L., & Quinn, P. 1989, ApJ, 342, 1
Hernquist, L., & Spergel, D. 1992, ApJ, 399, L117
Howard, S., Keel, W. C., Byrd, G., & Burkey, J. 1993, ApJ, 417, 502
Huchra, J. 1977, ApJS, 35, 171
Kikumoto, T., Taniguchi, Y., Suzuki, M., & Tomisaka, K. 1993, AJ, 106, 466
Lehnert, M., & Heckman, T. 1996, ApJ 472, 546
Markarian, B., & Lipovetski, V. 1971, Astrofizika, 7, 511
Melnick, J. 1977, ApJ, 213, 15
Mendez, D., & Esteban, C. 1997, ApJ, 488, 652
Mihos, J., & Hernquist, L. 1994, ApJ, 425, L13
Mulder, P., & van Driel, W. 1996, A&A, 309, 403
Mulder, P., van Driel, W., & Braine, J. 1995, A&A, 300, 687
Münch, G. 1958, Rev. Mod. Phys., 30, 1015
Nordgren, T., Chengalur, J., Salpeter, E., & Terzian, Y. 1997, AJ, 114, 77
Quinn, P. 1984, ApJ, 279, 596
Roy, J., Arsenault, R., & Joncas, G. 1986, ApJ, 300, 624
Rozas, M., Sabalise, N., Beckman, J., & Knapen, J. 1998, A&A, 338, 15
Sandage, A. 1963, ApJ, 138, 863
Sargent, W. 1970, ApJ, 160, 405
Schweizer, F., & Seitzer, P. 1988, A&A, 328, 88
Skillman, E., & Balick, B. 1984, ApJ, 280, 580
Smith, D., et al. 1996, ApJ, 473, L21
Smith, M., & Weedman, D. 1970, ApJ, 161, 33
Tamura, S., & Heidmann, J. 1986, PASJ, 38, 619
Taniguchi, Y., & Tamura, S. 1987, A&A, 181, 265
Terlevich, R., & Melnick, J. 1981, MNRAS, 195, 839
Walker, I., Mihos, J., & Hernquist, L. 1996, ApJ, 460, 121
Wallin, J., & Struck-Marcell, C. 1988, AJ, 96, 1850
Yang, H., Chu, Y.-H., Skillman, E., & Terlevich, R. 1996, AJ, 112, 146
Zwicky, F. 1957, Morphological Astronomy (Berlin: Springer)