New Views of the Magellanic Clouds
IAU Symposium, Vol. 190, 1999
Y.-H. Chu, N.B. Suntzeff, J.E. Hesser, and D.A. Bohlender, eds.

Kinematic Study of the Northwestern Part of the Bar of the LMC

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Abstract. We have been conducting a Fabry-Perot kinematic survey of ionized gas in the Magellanic Clouds in the Hα and [O III]λ5007 lines, using a 36-cm telescope at the European Southern Observatory. This poster presents our kinematic study of HII regions located at the northwestern parts of the LMC bar.

1. The Survey

An Hα and [OIII]λ5007 survey of the Magellanic Clouds is being carried out at the European Southern Observatory in La Silla, Chile (Le Coarer et al. 1993 for the SMC; Laval et al. 1987 for the LMC). The instrument consists of a 36-cm telescope with a focal reducer, a scanning Fabry-Perot interferometer, a photon counting camera, and a series of interference filters. We obtain images with a $38' \times 38'$ field of view, a $9''$ angular resolution, and a spectral sampling steps of 16 and 7 km s^{-1} for the Hα and [OIII] lines, respectively. The free spectral range is 377 km s^{-1} for Hα and 288 km s^{-1} for [OIII].

2. The Nebulae

In this poster we report on the sample of nebulae located on the northwest part of the LMC bar: DEM L117, DEM L115, DEM L107, DEM L99, DEM L98, DEM L97, DEM L89, DEM L76, N105, N103, N100, N33, N30, and N23. Table 1 shows the main characteristics of these nebulae. The linear diameters are derived by adopting a distance of 50 kpc to the LMC (Feast 1991). Columns 3 and 4 give the systemic heliocentric velocities measured in Hα and [OIII]. The last column indicates whether the line profiles show splittings.

3. Results

Five of the surveyed objects show splittings in their line profiles. By calculating the energy injected into the gas we have concluded that the splittings in DEM L84 is caused by a supernova explosion (Ambrocio-Cruz et al. 1997). The peculiar velocity field of DEM L86 and its morphology indicate that it contains four bubbles and two bright compact HII regions, almost coeval, embedded inside a large, faint nebular shell. This structure is formed by a combination of

Table 1. Main Characteristics of the Nebulae

Name of nebula	Diameter (pc)	$V_{H\alpha}$ (km s^{-1})	$V_{[OIII]}$ (km s^{-1})	Splitting
DEM L121 (N33)	24	302	–	no
DEM L117	22	306	–	no
DEM L115	26	305	–	no
DEM L107	126	304	–	no
DEM L106 (N30)	74	290, 310	–	yes
DEM L105 (N30)	130	285, 305	–	yes
DEM L99	61	298	–	no
DEM L98	68	305	–	no
DEM L97	65	303	–	no
DEM L89	131	293	–	no
DEM L86 (N105)	112	255	255	yes
DEM L84 (N103)	153	252	263	yes
DEM L79 (N100)	48	245	–	no
DEM L76	153	264	–	no
DEM L74 (N23)	39	259, 300	–	yes
DEM L73 (N23)	114	265	–	no
DEM L70 (N23)	81	265	–	no
DEM L66 (N23)	72	274	276	no

stellar winds and "champagne" outflows in a medium with a negative density gradient.

The line profiles observed in DEM L74 can be fitted by the sum of two Gaussians. The brighter component at 300 km s^{-1} is seen over the whole nebula and the fainter one at 259 km s^{-1} is seen only on the northwestern side. The intensity of this low-velocity component increases toward DEM L73 (located at northwest of DEM L74 and with a velocity of 265 km s^{-1}). Thus, these splittings cannot be interpreted as caused by expansive motions. This low-velocity component is most likely part of DEM L73 spilt over DEM L74.

The line profiles observed in DEM L105 and 106 can be fitted by the sum of two Gaussians. The first velocity component has a heliocentric velocity of 305-310 km s^{-1} and the second component has a velocity of 285-290 km s^{-1}. Since the second velocity component is best detected at the bright parts along the edge of the N30 bubble, the line split cannot be interpreted as caused by expansive motions. This 285 km s^{-1} component is probably associated with a low-velocity HI component; it is possible that some UV flux of the blue supergiant stars of N30 escapes and contributes to the ionization.

Acknowledgments. This work is supported by a fellowship from DGAPA-UNAM.

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