

random velocities (velocity dispersion in one coordinate of  $150 \pm 50 \text{ km s}^{-1}$ ), but show general Galactic rotation. The high velocity dispersion is remarkable for objects of this population.

#### VELOCITY DISPERSION AND LUMINOSITY FUNCTION OF PLANETARY NEBULAE IN THE NUCLEAR BULGE OF M31

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We used a sequence of velocity-modulated photographs to find and measure the radial velocities of faint planetary nebulae in the center of M31. The photographs were made with a Velocity Modulating Camera (VMC) which consists of a temperature-tuned  $2.1 \text{ \AA}$  (FWHM) (O III)  $\lambda 5007$  interference filter, a cooled, two-stage image intensifier, and a calibrating photomultiplier. The camera was mounted at the Cassegrain focus of the Shane 3 m telescope at Lick Observatory. We identified 19 new planetary nebulae, bringing the total number of known planetaries within 250 pc of M31's nucleus to 45. From the plate series, we derived radial velocities and relative brightnesses from 32 of the nebulae and placed radial velocity limits on the remaining nebulae in the field. By applying the method of maximum likelihood to the observed radial velocity distribution, we derive a mean heliocentric velocity of  $-309 (\pm 25) \text{ km s}^{-1}$  and a velocity dispersion of  $155 (\pm 22) \text{ km s}^{-1}$  for the planetary nebulae.

The first three magnitudes of the planetary nebulae luminosity function, after correction for interstellar extinction in M31, is given by  $n(\text{mag}) = \text{constant}$ . We derive a planetary-to-luminosity ratio (PLR) of  $69 \pm 9$  for the luminosity which corresponds to an integrated blue magnitude,  $m_p = 8.37$ . We combined the PLR with M31's integrated magnitude to estimate that there are  $2800 \pm 350$  nebulae in the first three magnitudes of M31's luminosity function. By combining our observed luminosity distribution with Jacoby's (1980) Magellanic Cloud distribution, we estimate that M31 has  $21,000 \pm 2600$  planetary nebulae within 8 magnitudes of the brightest nebulae.