

THE NEAR INFRARED SPECTRUM OF NGC7027

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NGC7027 has been observed at the 193cm telescope of OHP in the range 6800 - 10500 Å, using the CARELEC spectrograph equipped with a RCA CCD. The dispersion corresponded to a resolution 1 Å/px.

More than 100 recombination lines belonging to the (3, n) series of HI, the (5, n) and (6, n) series of HeII and to 7 out of the 10 (3l, n'l') series of HeI could be identified. Using case B recombination theory (Hummer, Storey, 1987) and the nebular physical conditions from a recent model (Gruenwald, Péquignot, 1987, these proceedings), it is found that the observed Paschen decrement agrees with theory within calibration and atmospheric correction uncertainties (~ 3% for n = 7-19 and ~ 7% for n = 20-40). However unidentified blends must be postulated with n = 13, 26, 34-36. There is no indication of the high electron densities found by Kaler et al (1976) from optical decrements. The Paschen series provides calibration of the near infrared to better than 5%. The HeII series are consistent with an unreddened ratio :

$$I(\text{HeII } 4686) / I(\text{H}\beta) = 0.50 \pm .04$$

in agreement with the optical data of Kaler et al (1976). The HeI series are identified for the first time and are consistent with a pure case B recombination (Storey, 1987, private communication) unreddened ratio :

$$I(\text{HeI } 4471) / I(\text{H}\beta) = (3.35 \pm .30) \times 10^{-2},$$

indicating that $\lambda 4471$ is not collisionally enhanced by more than 10%. The continuum agrees with recombination theory within 3% for wavelengths ≥ 7650 Å but an excess ~ 10% is found for $\lambda < 7600$ Å.

Many forbidden lines are measured for the first time. All multiplet line ratios available (CI, NI, SII, ClII, SIII, ArIII, ArIV, ClIV) are consistent with theory within observational uncertainty (often $\leq 3\%$) except that [SII]10370 may be ~ 10% weaker than predicted. [NiIII]7378 and most lines of multiplets [FeII]1F, 13F, 14F are observed, providing the first detection of these ions in this nebula. Several strong lines are lacking convincing identification.