Planetary Nebulae in the Outer Halo of
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abstract The halos of elliptical galaxies are faint and difficult to explore, but they contain vital clues to both structure and formation. We present the results of an imaging and spectroscopic survey for planetary nebulae (PNe) in the nearby elliptical . We extend the work of Hui (1995) well into the halo of the galaxy—out to distances of 100 and 50 kpc along the major and minor axes. We now know of 1141 PNe in , 780 of which are confirmed. Of these 780 PNe, 349 are new from this survey, and 148 are at radii beyond 20 kpc. PNe exist at distances up to 80 kpc (∼15r_e), showing that the stellar halo extends to the limit of our data. This study represents by far the largest kinematic study of an elliptical galaxy to date, both in the number of velocity tracers and in radial extent. We confirm the large rotation of the PNe along the major axis, and show that it extends in a disk-like feature into the halo. The rotation curve of the stars flattens at ∼100 with V/σ between 1 and 1.5, and with the velocity dispersion of the PNe falling gradually at larger radii. The two-dimensional velocity field exhibits a zero-velocity contour with a pronounced twist, showing that the galaxy potential is likely triaxial in shape, tending toward prolate. The total dynamical mass of the galaxy within 80 kpc is ∼5 × 10^{11}M, with M/L_B ∼ 13. This mass-to-light ratio is much lower than what is typically expected for elliptical galaxies.