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RADIO CONTINUUM AND H I OBSERVATIONS OF THE REMARKABLE PLANETARY NEBULA KJPN 8

Luis F. Rodríguez,[1] Yolanda Gómez,[1] and J. Alberto López[2]

Instituto de Astronomía, UNAM, México

We present Very Large Array (VLA) continuum observations of the core of KjPn 8 made with arc second angular resolution and taken at three epochs over a period of 2.8 years. The radio appearance of the planetary nebula seems to have experienced changes, tentatively attributed to variable illumination coming from the nucleus. We also present VLA observations of atomic hydrogen toward this source, made with an angular resolution of about 40″. We detect associated emission that suggests the presence of a mass of atomic hydrogen of order 0.07 $M_\odot$ in the envelope.

The bipolar planetary nebula (PN) KjPn 8, with its $14' \times 4'$ filamentary lobes, yet only $\sim 4''$ diameter bright core, is possibly the most extraordinary one of this type yet discovered at optical wavelengths (López et al. 1995). The simultaneous presence of an old, evolved structure traced by the bipolar lobes and of a compact bipolar jet system of very different orientation has made López et al. (2000) propose that we may be witnessing two distinct planetary nebulae events, probably coming from a binary system.

Here we present a summary of the results from new VLA observations made at 3.6 and 6 cm of the ionized core searching for possible variations in the appearance of this source. Since both ionized and molecular components have been found in KjPn 8, we also present sensitive observations of the H I line at 21 cm made with the goal of detecting a possible neutral component. A detailed account of this study can be found in Rodríguez et al. (2000).

Our three radio continuum maps all show a source with an angular extent of about 4″. However, there appear to be significant differences between them, suggesting temporal variation of the structure. In particular, since the maps are separated in time by similar amounts (1.2 years between the 1995 and the 1997 maps and 1.5 years between the 1997 and 1998 maps), there is a vague impression of clockwise "rotation" of the major axis of the structure. We tentatively attribute these changes to variable illumination coming from the stellar nucleus. Given the modest signal-to-noise ratio of our results and the difficulties to account for the rapid recombination times required, confirmation with additional VLA and *HST* data is needed. It is very important to substantiate the reality of this unusual phenomenon, since it could provide unique information on the nature of the stellar nucleus.

We detected extended H I line emission in the LSR velocity range of -117 to $+17$ km s^{-1}. We detect weak, compact H I emission in positional coincidence with KjPn 8 at the LSR velocity of -35 km s^{-1}, the systemic velocity of the associated molecular gas (Forveille et al. 1998). The positional coincidence and the agreement between the H I and CO LSR velocities suggest the existence of a real physical association. Only in this central channel was H I detected at the position of the planetary nebula. We derive a mass of $M_{\rm H\,I} = 0.07 \pm 0.02 M_\odot$. In comparison, the ionized mass has been estimated to be $M_{\rm H\,II} \simeq 0.0005 M_\odot$ (Huggins et al. 1997) and the molecular mass $M_{\rm H_2} \geq 0.03 M_\odot$ (Forveille et al. 1998).

[1]Apdo. Postal 72-3 (Xangari), Morelia, Michoacán, 58089, México, (l.rodriguez,y.gomez@astrosmo.unam.mx).

[2]Apdo. Postal 877, Ensenada, Baja California, 22800, México, (jal@astrosen.unam.mx).

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