RevMexAA (Serie de Conferencias), **15**, 80–80 (2003)

THREE-DIMENSIONAL PHOTOIONIZATION MODELING OF THE PLANETARY NEBULA NGC 6369

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The planetary nebula NGC 6369 has an irregular morphology. We present preliminary results of a 3-D modeling effort for this object. We compare the model with our observed spectrophotometric line images and density maps, also presented in this volume. The model results should give a more realistic understanding of the photoionization scenario in the nebula giving important clues to the true gas distribution in this object.

The preliminary model calculated for NGC 6369 in this work uses the same numerical code and technique as described in Gruenwald, Viegas, & Broguire (1997) and Monteiro et al. (2000), respectively.

The model we present is a preliminary version of a more detailed study of the nebula NGC 6369. The structure adopted for the object is a combination of two distinct regions. One that is responsible for the observed bright annular shape and another that forms the two fainter lobes. The main central region is an elongated cylinder with narrower and denser central regions: a waist. We used a density gradient in this structure that decreases outward along the symmetry axis. Random density variations were also introduced in the structure. This is justified by high resolution *HST* images that show strong clumping in the nebula. The results of the 3-D model were compared to our observations and 1-D models. The total line fluxes for the most important lines fit the observations within the uncertainties for the 1-D and 3-D models. For a full description of the observations see Monteiro et al. (2003).

Unlike the 1-D model, the 3-D model is able to explain not only the total line fluxes but also the morphological appearance of the nebula in many wavelengths (see Figure 1. Even at this preliminary stage, it is clearly better than the one-dimensional models, since it brings together aspects linked to the spatial structure as well as the ionization processes taking place in the nebula.

Some differences appear for the abundances of oxygen, nitrogen and sulfur, obtained from the 1-D and 3-D models, all of these being lower in the three-dimensional case. No attempt is made at this point to explain this discrepancy but one can argue that it is likely to be due to the more realistic representation of the spatial structure of the nebula.

Much information can be extracted from this study leading to a better understanding of the relative importance of different processes taking place in the nebula.

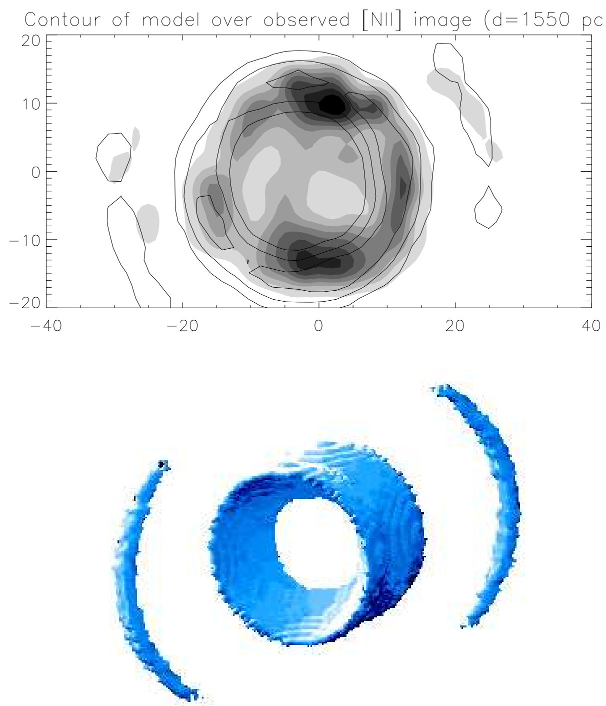

Fig. 1. Observed image compared with model image for $d = 1550$ pc and three-dimensional model structure used.

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Monteiro, H., Schwarz, H. E., Heathcote, S., & Gruenwald, R. 2003, RevMexAA(SC), 15, 79 (this volume)

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