

A Circumstellar Disk in IRAS 23151+5912?

Miguel A. Trinidad, Tatiana Rodríguez-Esnard and Josep M. Masqué

Departamento de Astronomía, Universidad de Guanajuato,
Apdo Postal 144, Guanajuato, México

email: trinidad@astro.ugto.mx, tatiana@astro.ugto.mx, jmasque@astro.ugto.mx

Abstract. We present radio continuum and water maser observations toward the high-mass star-forming region IRAS 23151+5912 from the VLA and VLBA archive, respectively. We detected a continuum source, which seems to be a hypercompact HII region. In addition, a water maser group about 4'' south from the continuum source was detected. We present preliminary results of the analysis of three observations epochs of the water masers, which are tracing an arc-like structure. However, its kinematics is quite complex, since while one section of the structure seems to be moving away from one center, another section seems to be approaching.

Keywords. Stars: formation, HII regions, ISM: individual (IRAS 23151+5912), Masers

1. Introduction

IRAS 23151+5912, a high mass star-forming region, is located at the edge of a molecular cloud in Cepheus. It has a luminosity of $\sim 5 \times 10^5 L_{\odot}$ (at a distance of 5.7 Kpc; Sridharan *et al.* 2002), but only one radio continuum source has been detected, which seems to be consistent with a hypercompact HII region (e.g. Rodríguez-Esnard *et al.* 2014). In addition, three water masers groups have been detected toward IRAS 23151+5912, which are aligned in the northeast-southwest direction and one of them is spatially associated with the radio continuum source (Rodríguez-Esnard *et al.* 2014). This water maser group seems to be tracing an expanding shell-like structure of about 680 AU.

2. Observations

All observational data were obtained from the VLA archive of the NRAO†. Continuum observations at 1.3, 2 and 6 cm were carried out at B, A and A configuration, respectively (VLA/14A-133 project), while water maser observations were carried out with the VLBA during six epochs (BR145 project) at a rest frequency of 22.2350 GHz.

3. Results

A single radio continuum source was detected in the region at 1.3, 2 and 6 cm, which was reported by Rodríguez-Esnard *et al.* (2014) and is spatially associated with a water maser group. Based on its spectral energy distribution, this continuum source seems to be consistent with a hypercompact HII region (see Figure 1a). On the other hand, high angular resolution observations (~ 0.4 mas) of the water masers, detected about 4'' south from the continuum source, show a rather complex distribution and it is difficult to infer a clear tendency of their kinematics. However, the maser distribution and velocity are compatible with an expanding/rotating shell-like structure of about 680 AU (Figure 1b).

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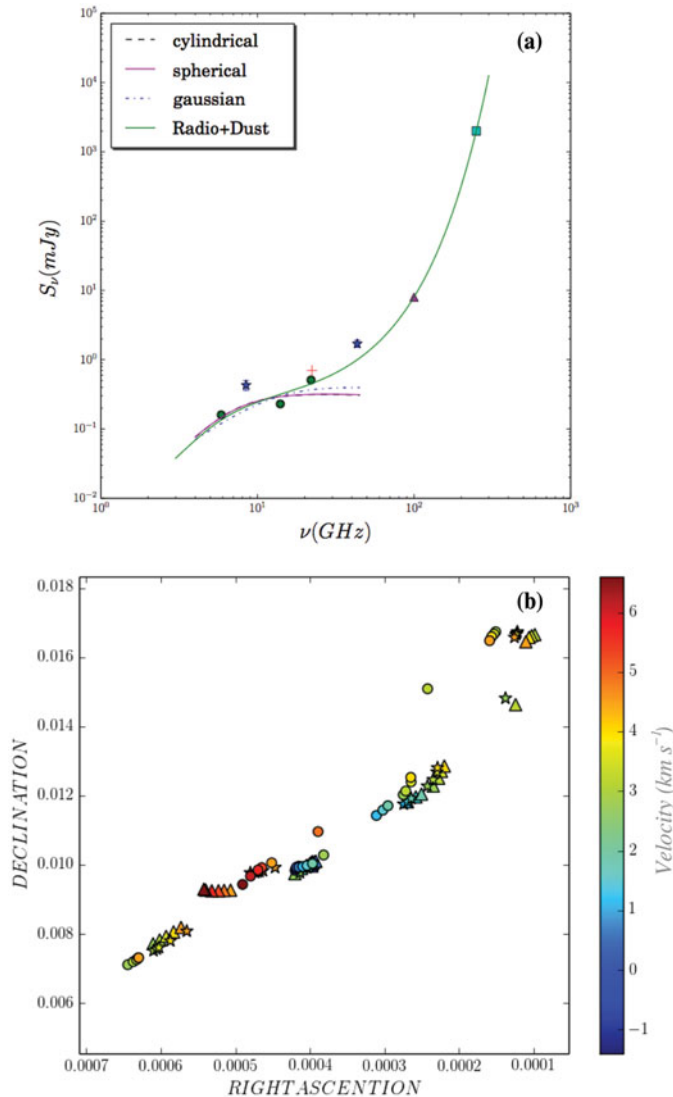


Figure 1. *a)* Spectral energy distribution of the radio continuum source detected in the region IRAS 23151+5912: 1.3, 2 and 6 cm (circles; this work), 0.7 and 3.6 cm (stars; Garay et al. 2007), 3 mm (triangle; Schnee & Carpenter 2009) and 875 μm (square; Beuther *et al.* 2002). The solid line represents the best fit, which considers the contribution of the dust grains. *b)* Spatial distribution of the water masers (only the first three observed epochs are plotted). Circles and triangles represent the first and third epoch, respectively. The systematic velocity of the cloud (-54.4 km s^{-1}) is indicated by zero in the color bar (see the on-line version). Masers do not seem to be tracing a clear structure, however, some subgroups show an expanding structure.

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