



Catalogue of HI Parameters (CHIPA)

J. Saponara^{1,2}, P. Benaglia^{1,2}, B. Koribalski³ & I. Andruchow⁴

¹ *Instituto Argentino de Radioastronomía (CONICET)*

² *Facultad de Ciencias Astronómicas y Geofísicas (UNLP)*

³ *Australia Telescope National Facility, CSIRO Astronomy Space Science*

⁴ *Instituto de Astrofísica La Plata (IALP)*

Contact/ JS: jsaponara@iar.unlp.edu.ar

Resumen / El Catálogo de parámetros de HI de galaxias (CHIPA, por sus siglas en inglés) es la continuación natural del realizado por M. C. Martin en 1998. CHIPA provee los parámetros más importantes de galaxias cercanas derivados a partir de observaciones de HI. El catálogo contiene datos de unas 1400 galaxias de todo el cielo y de diferentes tipos morfológicos.

Algunos de los parámetros presentes en CHIPA son el diámetro óptico, la magnitud en el azul, la distancia, el tipo morfológico, la extensión en HI. Se despliegan, además, para los casos existentes en la literatura los mapas de distribución del HI, de velocidades y de dispersión de velocidades.

El principal objetivo de este catálogo es hacer las consultas bibliográficas para astrónomos más fáciles, a través de búsquedas en una base de datos accesibles desde internet que será pública en 2015 (la página web está en construcción). La base de datos fue construida utilizando el código abierto “mysql (sql, Structured Query Language, sistema de gestión de bases de datos relacional)”, mientras que la página web se construyó con “html (Hypertext Markup Language)” y “php (Hypertext Preprocessor)”.

Abstract / The catalog of HI parameters of galaxies HI (CHIPA) is the natural continuation of the compilation by M. C. Martin in 1998. CHIPA provides the most important parameters of nearby galaxies derived from observations of the neutral Hydrogen line. The catalogue contains information of 1400 galaxies across the sky and different morphological types.

Parameters like the optical diameter of the galaxy, the blue magnitude, the distance, morphological type, HI extension are listed among others. Maps of the HI distribution, velocity and velocity dispersion can also be display for some cases.

The main objective of this catalogue is to facilitate the bibliographic queries, through searching in a database accessible from the internet that will be published in 2015 (the website is under construction). The database was built using the open source “mysql (SQL, Structured Query Language, management system relational database)”, while the website was built with “Html (Hypertext Markup Language)” and “PHP (Hypertext Preprocessor)”.

Keywords / Catalogues — Galaxies: dwarf, irregular – Radio lines: galaxies

1. Introduction

Radio observing techniques have been improving since the first detection of the HI line: from the horn of Ewen & Purcell back in 1951 to the focal plane arrays receivers of ASKAP (2014). Although the first radio interferometer was tested in 1946, up to the seventies or eighties the data were mostly observed with single dishes. Martin 1998a,b published a comprehensive catalogue of HI maps of galaxies, taking into account the information obtained from single antennas between 1953 and 1995. But since the last decades, interferometric instruments are collect data on individual objects and surveys with very high angular and velocity resolution. In this work in progress, we processed the information collecting from the most important interferometric surveys. Nevertheless, our work updates and complements the Martin 1998a catalogue; since the Bright Galactic Catalog ? of the HI Parkes All Sky Survey (HIPASS)* was also included by us.

* single dish 1997-2002, <http://hipass.anu.edu.au/>

Observations of the 21 cm line of atomic Hydrogen have proven to be crucial for our understanding of the process leading to star formation, the dynamics and structure of the interstellar medium (ISM) and dark matter distribution in galaxies, all issues related to galaxy evolution.

Today, many surveys focus on these topics of research. For instance, “The HI nearby galaxy survey” (THINGS, www.mpa-hd.mpg.de/THINGS/Overview.html) is a high spectral and spatial resolution survey of HI emission from nearby galaxies obtained using the NRAO Very Large Array (VLA). THINGS produced integrated HI maps, velocity field maps, velocity dispersion maps and individual channel maps of each galaxy. “The Westerbork HI survey of irregular and spiral galaxies” (WHISP, www.astron.nl/wow/testcode.php?project=3) also studied the structure and kinematics of the HI in galaxies and galaxy dynamics with HI as a tracer.

More restrictive morphological type surveys have made an emphasis on dwarf galaxies; VLA-ANGST

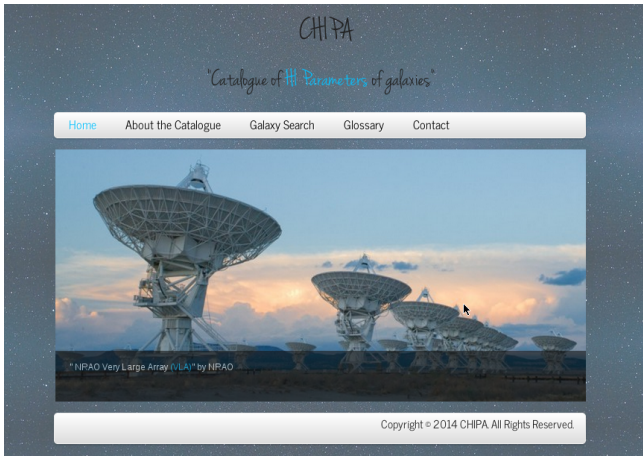


Fig. 1: CHIPA’s web page.

(science.nrao.edu/science/surveys/vla-angst) and FIGGS (Begum et al., 2008) are some of them. Dwarf galaxy studies are important because, in the hierarchical models of galaxy formation, they would, in some ways, be analogues of the primordial building blocks of large galaxies. Besides, those galaxies could provide data that would be useful to test the prediction of cold dark matter models.

Our main goal is to gather, in a master database named CHIPA (Catalogue of HI PARAMETERS of galaxies, see Fig. 1), the most important parameters derived from 21 cm line interferometric observations of galaxies. At the moment, the database contains the information collected from THINGS, VLA-ANGST, Little THINGS, FIGGS and WHISP surveys.

2. Brief description of survey samples:

- The HI nearby galaxy survey (THINGS, Walter et al. 2008) comprises 34 objects at distances up to 15 Mpc (resulting in linear resolutions of ~ 100 to ~ 500 pc), star formation rates $\sim 10^{-3}$ to $6 M_{\odot}\text{yr}^{-1}$, total HI masses $M_{\text{HI}} < 14 \times 10^9 M_{\odot}$, absolute blue magnitudes between -11.5 and -21.7 , and metallicities 7.5 to 9.2 in units of $12 + \log[\text{O}/\text{H}]$.
- The Local Irregulars That Trace Luminosity Extremes, The HI Nearby Galaxy Survey (Little-THINGS, Hunter et al. 2012) contains dwarf galaxies that are relatively nearby, up to 10.3 Mpc.
- For the Westerbork HI survey of irregular and spiral galaxies (WHISP, van der Hulst et al. 2001), the galaxy sample has been selected from the Uppsala General Catalogue (UGC) (Nilson 1973), and contains galaxies with $\delta > 20^{\circ}$ and sizes greater than $1.2'$.
- The Faint Irregular Galaxies GMRT Survey (FIGGS, Begum et al. 2008) comprises a sample of extremely low mass dwarf irregular galaxies population with: $M_B > -14.5$, HI mass of $\sim 3 \times 10^7 M_{\odot}$, integral HI flux $> 1 \text{ Jy km}^{-1}$ and optical B-band major-axis > 1.0 arcmin.
- A high-resolution HI survey of nearby dwarf galaxies (VLA-ANGST, Ott et al. 2012) targeted a complete volume-limited sample of 69 galaxies, above a Galac-

tic latitude of $|b| > 20^{\circ}$, outside the Local Group but within 3.5 Mpc, with additional cones out to 4 Mpc in the directions of the M81 and Sculptor groups.

3. The most important parameters

The first version of CHIPA provides two search criteria: by survey name and by coordinates (see Fig. 2). We present in this catalogue the most representative and relevant data on basic optical and HI properties of the galaxies, in particular optical diameter, blue magnitude, distance, morphological type, HI angular extension, HI mass, systemic velocity and some observing setups (the interferometer used, angular and velocity resolution, etc). In addition, CHIPA contains the HI distribution, velocity distribution, velocity dispersion maps and global HI profile (see Fig. 3) whenever is possible. Unfortunately, the information provided by surveys is not homogeneous and we could not uniform it (e.g: moment maps are not available for every galaxy in this catalogue, etc).



Fig. 2: Search example by survey name.

4. Future plans

CHIPA contains data on basic optical and HI properties of about 1400 galaxies. More than 500 were observed with interferometers. The new catalogue will be available soon in the “Nuevo Observatorio Virtual Argentino” (NOVA)** webpage. The next step will be

** <http://nova.conicet.gov.ar/>

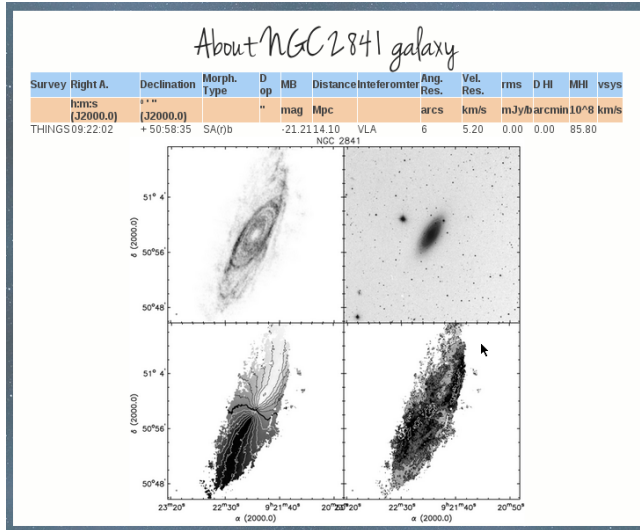


Fig. 3: The most important parameters of a particular galaxy.

to increase the number of galaxies in the database, by adding information from studies about reduced groups of them. We will include, among others, the SAURON sample Peletier et al. 2008, 12 nearby lenticular and elliptical galaxies) and the NUGA objects García-Burillo et al. 2003 16 nearby spiral galaxies hosting low luminosity AGNs). To improve the search performance, we plan to annex the interferometer name and angular resolution search criteria. The catalogue can be finally extended to include different types of galaxies like Blue Compact Dwarfs, Tidal Dwarfs, multiple systems, etc.

References

- Begum A., et al., 2008, MNRAS, 386, 1667
 García-Burillo S., et al., 2003, in Collin S., Combes F., Shlosman I., eds, Active Galactic Nuclei: From Central Engine to Host Galaxy Vol. 290 of Astronomical Society of the Pacific Conference Series, NUGA: The IRAM Survey of AGN Spiral Hosts. p. 423
 Hunter D. A., et al., 2012, AJ, 144, 134
 Martin M. C., 1998a, A&AS, 131, 73
 Martin M. C., 1998b, A&AS, 131, 77
 Nilson P., 1973, Uppsala general catalogue of galaxies
 Ott J., et al., 2012, AJ, 144, 123
 Peletier R. F., et al., 2008, in Bureau M., Athanassoula E., Barbuy B., eds, IAU Symposium Vol. 245 of IAU Symposium, Spiral galaxies in the SAURON survey. pp 271–276
 van der Hulst J. M., van Albada T. S., Sancisi R., 2001, in Hibbard J. E., Rupen M., van Gorkom J. H., eds, Gas and Galaxy Evolution Vol. 240 of Astronomical Society of the Pacific Conference Series, The Westerbork HI Survey of Irregular and Spiral Galaxies, WHISP. p. 451
 Walter F., et al., 2008, AJ, 136, 2563