

# Life cycle of an article at CDS



THE ASTROPHYSICAL JOURNAL **AAS**

doi:10.1088/0004-637X/763/1/32

## PROBING THE OUTER GALACTIC HALO WITH RR LYRAE FROM THE CATALINA SURVEYS

A. J. Drake<sup>1</sup>, M. Catelan<sup>2,3</sup>, S. G. Djorgovski<sup>1</sup>, G. Torrealba<sup>2</sup>, M. J. Graham<sup>1</sup>, V. Belokurov<sup>4</sup>, S. E. Koposov<sup>4</sup>, A. Mahabal<sup>1</sup>, J. L. Prieto<sup>5</sup>, C. Donalek<sup>1</sup> [Show full author list](#)

Published 2013 January 2 • © 2013. The American Astronomical Society. All rights reserved. • *The Astrophysical Journal*, Volume 763, Number 1

Everything begins with astronomer's data.

DJIN - 2013ApJ...763...32D

File Name Identifier Search Configuration Help

Journal: ApJ Volume: 763 Bibcode: 2013ApJ...763...32D

27 object names (86)

- Virgo (1)
- ACT-86 (1)
- AURA (1)
- Cetus stream (1)
- DR8 (14)
- FERMI08-0025 (1)
- Galactic bulge (2)
- Galactic center (1)
- Hercules-Aquila cloud (1)
- J2000 (1)
- LM10 (18)
- LMC (1)
- M3 (1)
- Magellanic Clouds (2)
- Monoceros stream (1)
- NGC 5272 (5)
- P07-021 (1)
- RR LYRAE (4)
- Sagittarius dwarf galaxy (1)
- Sagittarius stream (4)
- Sgr dwarf galaxy (1)
- Sgr K (1)
- Sgr stream (17)
- V0420 Peg (1)
- Virgo stellar stream (1)
- W UMa (2)

## PROBING THE OUTER GALACTIC HALO WITH RR LYRAE FROM THE CATALINA SURVEYS

**Authors**  
A. J. Drake, M. Catelan, S. G. Djorgovski, G. Torrealba, M. J. Graham, V. Belokurov, S. E. Koposov, A. Mahabal, J. L. Prieto, C. Donalek, R. Williams, S. Larson, E. Christensen, and E. Beshore

**Abstract**  
ABSTRACT We present analysis of 12,227 type-ab RR Lyraes (RRLs) found among the 200 million public light curves in Catalina Surveys Data Release 1. These stars span the largest volume of the Milky Way ever surveyed with RRLs, covering ~20,000 deg<sup>2</sup> of the sky (0° < α < 360°, -22° < δ < 65°) to heliocentric distances of up to 60 kpc. Each of the RRLs is observed between 60 and 419 times over a six-year period. Using period finding and Fourier fitting techniques we determine periods and apparent magnitudes for each source. We find that the periods are generally accurate to σ = 0.002% in comparison to 2842 previously known RRLs and 100 RRLs observed in overlapping survey fields. We photometrically calibrate the light curves using 445 Landolt standard stars and show that the resulting magnitudes are accurate to ~0.05 mag using Sloan Digital Sky Survey (SDSS) data for ~1000 blue horizontal branch stars and 7788 RRLs. By combining Catalina photometry with SDSS spectroscopy, we analyze the radial velocity and metallicity distributions for >1500 of the RRLs. Using the accurate distances derived for the RRLs, we show the paths of the Sagittarius tidal streams crossing the sky at heliocentric distances from 20 to 60 kpc. By selecting samples of Galactic halo RRLs, we compare their velocity, metallicity, and distance with predictions from a recent detailed N-body model of the Sagittarius system. We find that there are some significant differences between the distances and structures predicted and our observations.

**Keyword**  
Key words: galaxies: stellar content - Galaxy: formation - Galaxy: stellar content - Galaxy: structure - stars: variables: RR Lyrae

**1. INTRODUCTION**

DJIN is a supervised tool extracting the possible names of astronomical objects from an article. After careful checking, the objects are then associated to the reference in SIMBAD.

Simbad objects (12)

### Dictionary of Nomenclature of Celestial Objects

Details on Acronym: [DCD2013]

[DCD2013] (Drake+Catelan+Djorgovski+, 2013) = (CSS)

**Write:** <<[DCD2013] CSS JHHMMSS.s+DDMMSS>>  
<<[DCD2013] MLS JHHMMSS.s+DDMMSS>>

**N:** 12227+2040+1207

**Object:** RRLyr (SIMBAD class: RRLyr = Variable Star of RR Lyr type)

**Note:** N=12227+2040+1207 RR Lyrae from the Catalina Surveys Data Release 1 (see <http://nessi.cacr.caltech.edu/DataRelease/index1.html>) and also <http://nessi.cacr.caltech.edu/DataRelease/RRL.html>), that used observations from the Catalina Sky Survey 0.7m Schmidt (CSS), and Mt. Lemmon Survey 1.5m Cass (MLS) telescopes.

**Ref:** =2013ApJ...763...32D  
by DRAKE A.J., CATELAN M., DJORGOVSKI S.G., TORREALBA G., GRAHAM M.J., BELOKUROV V., KOPOSOV S.E., MAHABAL A., PRIETO J.L., DONALEK C., WILLIAMS R., LARSON S., CHRISTENSEN E., BESHORE E.  
Astrophys. J., 763, 32 (2013)  
*Probing the outer galactic halo with RR Lyrae from the Catalina surveys.*  
• Tables 1-2: <<[DCD2013] CSS JHHMMSS.s+DDMMSS>> N=12227.

An acronym is created if needed.

Portal Simbad Vizier Aladin X-Match Other Help

## Catalog Selection Page

J/ApJ/763/32 Galactic halo RRab stars from CSS (Drake+, 2013) [ReadMe+ftp](#)

[Similar Catalogs](#) [2013ApJ...763...32D](#)

J/ApJ/763/32/table1 (c) Parameters of RRab stars (12379 rows)

J/ApJ/763/32/table2 (c) SDSS data for CSS RRab stars (7760 rows)

Reset All

ALL

(c) indicates tables which contain celestial coordinates

Large tables are standardized described and inserted into the FTP and Vizier.



**Priority status**

Meeting with at least 2 astronomers and 1 documentalist

Access through Aladin and other VO tools and diverse CDS services is maintained by CDS developers in close relation to the users' needs.

Aladin v8.0

Fichier Edition Image Catalogue Graphique Couverture Outil Vue Interop Aide

Position: 13:42:20.44 +28:28:44.0

Referentiel: ICRS

DSS + SDSS + 2MASS + WISE + GALEX + PLANCK + AKARI + XMM + Fermi + Simbad + NED +

SDSS colored

Chercher

© 2014 UDS/CNRS - by CDS - Distributed under GNU GPL v3

Around NGC 5272...

Send to VO tools

Thanks for acknowledging the Vizier Service  
Rules of usage of Vizier data

2013ApJ...763...32D

other query Identifier Coordinate Criteria Reference Basic Script TAP Output Help  
modes: query query query query query submission options

Query: 2013ApJ...763...32D C.D.S. - SIMBAD4 rel 1.225 - 2015.09.10CEST13:24:54

send the bibcodes to ADS

2013ApJ...763...32D - Astrophys. J., 763, 32 (2013) - 29.01.13 15.05.15 January(III) 2013 2013-01-20

## Probing the outer galactic halo with RR Lyrae from the Catalina surveys.

DRAKE A.J.; CATELAN M.; DJORGOVSKI S.G.; TORREALBA G.; GRAHAM M.J.; BELOKUROV V.; KOPOSOV S.E.; MAHABAL A.; PRIETO J.L.; DONALEK C.; WILLIAMS R.; LARSON S.; CHRISTENSEN E.; BESHORE E.

**Abstract (from CDS):** We present analysis of 12,227 type-ab RR Lyraes (RRLs) found among the 200 million public light curves in Catalina Surveys Data Release 1. These stars span the largest volume of the Milky Way ever surveyed with RRLs, covering ~20,000 deg<sup>2</sup> of the sky (0° < α < 360°, -22° < δ < 65°) to heliocentric distances of up to 60 kpc. Each of the RRLs is observed between 60 and 419 times over a six-year period. Using period finding and Fourier fitting techniques we determine periods and apparent magnitudes for each source. We find that the periods are generally accurate to σ = 0.002% in comparison to 2842 previously known RRLs and 100 RRLs observed in overlapping survey fields. We photometrically calibrate the light curves using 445 Landolt standard stars and show that the resulting magnitudes are accurate to ~0.05 mag using Sloan Digital Sky Survey (SDSS) data for ~1000 blue horizontal branch stars and 7788 RRLs. By combining Catalina photometry with SDSS spectroscopy, we analyze the radial velocity and metallicity distributions for >1500 of the RRLs. Using the accurate distances derived for the RRLs, we show the paths of the Sagittarius tidal streams crossing the sky at heliocentric distances from 20 to 60 kpc. By selecting samples of Galactic halo RRLs, we compare their velocity, metallicity, and distance with predictions from a recent detailed N-body model of the Sagittarius system. We find that there are some significant differences between the distances and structures predicted and our observations.

**Abstract Copyright:** American Astronomical Society 2013

**Journal keyword(s):** galaxies: stellar content - Galaxy: formation - Galaxy: stellar content - Galaxy: structure - stars: variables: RR Lyrae

**Nomenclature Note:** Tables 1-2: [DCD2013] CSS JHHMMSS.s+DDMMSS N=12227.

Vizier on-line data: <Available at CDS (J/ApJ/763/32): table1.dat table2.dat>

Simbad objects (12303)

Link(s): [Full paper ADS services](#)

Large tables with priority 1 are ingested into SIMBAD after cross-identification with the database via the COSIM program.