

ASTRONOMICAL SOCIETY OF THE PACIFIC
CONFERENCE SERIES

Volume 509

20th EUROPEAN WHITE DWARF WORKSHOP

Proceedings of a conference held at
University of Warwick, Coventry, West Midlands, United Kingdom
25–29 July 2016

Edited by

Pier-Emmanuel Tremblay

Department of Physics, University of Warwick, Coventry, UK

Boris Gänsicke

Department of Physics, University of Warwick, Coventry, UK

Tom Marsh

Department of Physics, University of Warwick, Coventry, UK



SAN FRANCISCO

Contents

Preface	xiii
<i>P.-E. Tremblay, B. Gänsicke, and T. Marsh</i>	
Participants	xv
Conference Photograph	xxiii

Part I. White Dwarf Samples, Surveys, and Luminosity Functions

The Montreal White Dwarf Database: A Tool for the Community	3
<i>P. Dufour, S. Blouin, S. Coutu, M. Fortin-Archambault, C. Thibeault, P. Bergeron, and G. Fontaine</i>	
White Dwarfs in Gaia Data Release 1	9
<i>S. Jordan</i>	
Physical Properties of White Dwarfs from Multi-Band Photometry	13
<i>R. Raddi</i>	
A Tale of Two Surveys	19
<i>J. B. Holberg, T. D. Oswalt, and E. Sion</i>	
Untangling the White Dwarf Luminosity Functions	25
<i>M. C. Lam</i>	
A Population Synthesis Study of the White Dwarf Cooling Sequence of the Galactic Bulge	29
<i>S. Torres, E. García-Berro, R. E. Cojocaru, and A. Calamida</i>	
The Double Cooling Sequence of the Globular Cluster ω Centauri	37
<i>E. García-Berro, L. Sendra, S. Torres, and L. G. Althaus</i>	
White Dwarfs in the Metal-Rich Open Cluster NGC 6253	43
<i>E. J. Jeffery, F. Campos, A. Romero, and S. O. Kepler</i>	
A Study of the SDSS White Dwarf Component in the LSPM Proper Motion Survey	51
<i>A. Darveau-Bernier, P. Bergeron, and S. Lépine</i>	
Get Ready for Gaia: Cool White Dwarfs in Common Proper Motion with Tycho Stars	55
<i>N. Hambly, N. Rowell, and M. Lam</i>	
Completeness of the Nearby White Dwarfs Sample: Let Us Count the Ways	59
<i>T. D. Oswalt, J. Holberg, and E. Sion</i>	

Current Status of the Hot White Dwarf Luminosity Function and non-DA to DA Ratio from SDSS Data	65
<i>J. Krzesinski and G. Stachowski</i>	
Sensitivity Analysis of Hierarchical Models for the Ages of Galactic Halo White Dwarfs	69
<i>S. Si, D. A. van Dyk, and T. von Hippel</i>	
Bayesian Evidence for Two Populations of White Dwarfs: Preliminary Results . .	73
<i>R. Valentim, A. D. Romero, S. O. Kepler, J. E. Horvath, and E. M Rangel</i>	

Part II. SN Ia Connection

Close Binary Progenitors and Ejected Companions of Thermonuclear Supernovae	79
<i>S. Geier, T. Kupfer, U. Heber, P. Nemeth, E. Ziegerer, A. Irrgang, M. Schindewolf, T. R. Marsh, B. T. Gänsicke, B. N. Barlow, and S. Bloemen</i>	
Stripped Red Giants - Helium Core White Dwarf Progenitors and their sdB Siblings	85
<i>U. Heber</i>	
Dynamical Masses of Accreting White Dwarfs	91
<i>A. F. Pala and B. T. Gänsicke</i>	

Part III. White Dwarfs with Planetary Systems

The DECam Minute Cadence Survey	101
<i>C. Belardi, M. Kilic, J. A. Munn, A. Gianninas, S. D. Barber, A. Dey, and P. B. Stetson</i>	
New Observations of the Mysterious Metal-Polluted White Dwarf GD 394	107
<i>D. J. Wilson, B. T. Gänsicke, D. Koester, J. Holberg, M. R. Burleigh, and C. Belardi</i>	
Explorations of Dusty Debris Disk Geometry	113
<i>D. E. Dennihy, J. H. Debes, and J. C. Clemens</i>	
Disk Accretion of Tidally Disrupted Rocky Bodies onto White Dwarfs	121
<i>W. Feng and S. Desch</i>	
The Dusty Accretion of Polluted White Dwarfs	127
<i>A. Bonsor, J. Farihi, M. C. Wyatt, and R. van Lieshout</i>	
New White Dwarf-Brown Dwarf Binaries	133
<i>S. L. Casewell, S. Geier, and N. Lodieu</i>	

Part IV. Atmospheres: Composition and Evolution

Modeling the Spectra of Dense Hydrogen Plasmas: Beyond Occupation Probability	143
<i>T. A. Gomez, M. H. Montgomery, T. Nagayama, D. P. Kilcrease, and D. E. Winget</i>	
Reaching Higher Densities for Laboratory White Dwarf Photospheres to Measure Spectroscopic Line Profiles	149
<i>R. E. Falcon, J. E. Bailey, T. A. Gomez, M. Schaeuble, T. Nagayama, M. H. Montgomery, D. E. Winget, and G. A. Rochau</i>	
Infrared Opacities in Dense Atmospheres of Cool White Dwarf Stars	155
<i>P. M. Kowalski, S. Blouin, and P. Dufour</i>	
Trace Hydrogen in Helium Atmosphere White Dwarfs as a Possible Signature of Water Accretion	163
<i>N. P. Gentile Fusillo, B. T. Gänsicke, J. Farihi, D. Koester, M. R. Schreiber, and A. F. Pala</i>	
The Impact of Radiative Atmospheres on Spectroscopic and Photometric Analyses of Cool White Dwarfs	169
<i>É. Lecavalier-Hurtubise and P. Bergeron</i>	
Trace Metals in PG1159 Stars and the First Identification of Metal Line Forbidden Components in Astrophysical Sources	177
<i>K. Werner, D. Hoyer, T. Rauch, J. W. Kruk, and P. Quinet</i>	
Heavy Metals Resisting Gravity in White Dwarfs?	183
<i>T. Rauch, S. Gamrath, P. Quinet, D. Hoyer, K. Werner, and J. W. Kruk</i>	
Is the DO-type White Dwarf RE 0503–289 a Unique Object?	189
<i>D. Hoyer, T. Rauch, and K. Werner</i>	
Understanding the Spectrum of the Very Hot DA White Dwarf PG 0948+534 . . .	195
<i>S. P. Preval and M. A. Barstow</i>	
A Study of the Lyman- α Line Profile in DBA White Dwarfs	201
<i>C. Genest-Beaulieu and P. Bergeron</i>	
Magnetic White Dwarfs with Heavy Elements	205
<i>F. Hardy, P. Dufour, and S. Jordan</i>	
Spectroscopic Analysis of Hybrid White Dwarf Spectra from the Sloan Digital Sky Survey	211
<i>P. M. Manseau, P. Bergeron, and E. M. Green</i>	
On the Interpretation of Cool, Helium-rich White Dwarfs Showing Traces of Hydrogen	215
<i>B. Rolland, P. Bergeron, and G. Fontaine</i>	
Spectral Analysis of the sdO Standard Star Feige 34	219
<i>M. Latour, P. Chayer, E. M. Green, and G. Fontaine</i>	
The Role of Fingering Convection in Accreting Hydrogen-Rich White Dwarfs: The Case of GD 133 and G 29-38	223
<i>F. C. Wachlin, S. Vauclair, G. Vauclair, and L. G. Althaus</i>	

A New Generation of Cool White Dwarf Atmosphere Models Using Ab Initio Calculations	227
<i>S. Blouin, P. Dufour, and P. Kowalski</i>	
Helium at White Dwarf Photospheric Conditions: Preliminary Laboratory Results	231
<i>M. Schaeuble, R. E. Falcon, T. A. Gomez, D. E. Winget, M. H. Montgomery, and J. E. Bailey</i>	
The Tübingen Model-Atom Database: A Revised Aluminum Model Atom and its Application for the Spectral Analysis of White Dwarfs	235
<i>L. Löbbling</i>	

Part V. Pulsating and Variable White Dwarfs

Calibrating White Dwarf Asteroseismic Fitting Techniques	243
<i>B. Castanheira, A. D. Romero, and A. Bischoff-Kim</i>	
H Dominates the Dispersion of Period Spacing for DAV Stars	249
<i>Y. Chen</i>	
Seismology of an Ensemble of ZZ Ceti Stars	255
<i>J. C. Clemens, P. C. O'Brien, B. H. Dunlap, and J. J. Hermes</i>	
Understanding Systematics in ZZ Ceti Model Fitting to Enable Differential Seismology	263
<i>J. T. Fuchs, B. H. Dunlap, J. C. Clemens, J. A. Meza, E. Dennyhy, and D. Koester</i>	
Asteroseismology of Kepler ZZ Ceti Stars with Fully Evolutionary Models	269
<i>A. D. Romero, A. H. Corsico, B. G. Castanheira, F. C. De Gerónimo, S. O. Kepler, L. G. Althaus, D. Koester, A. Kawka, A. Gianninas, and C. Bonato</i>	
Signature of the Core Stratification in Pulsating White Dwarfs and Tests of Seismic Inversion	275
<i>S. Charpinet, N. Giammichele, P. Brassard, and G. Fontaine</i>	
Unraveling the Internal Chemical Composition of Kepler White Dwarf Pulsators	283
<i>N. Giammichele, S. Charpinet, G. Fontaine, and P. Brassard</i>	
Recent Advances in the Theoretical Modeling of Pulsating Low-Mass He-Core White Dwarfs	289
<i>A. H. Córscico, L. G. Althaus, L. M. Calcaferro, A. M. Serenelli, S. O. Kepler, and C. S. Jeffery</i>	
Asteroseismology of the ZZ Ceti Star WD 0246+326	295
<i>C. Li, J. Fu, L. Fox-Machado, and J. Su</i>	
The First Six Outbursting Cool DA White Dwarf Pulsators	303
<i>K. J. Bell, J. J. Hermes, M. H. Montgomery, D. E. Winget, N. P. Gentile Fusillo, R. Raddi, and B. T. Gänsicke</i>	
Semi-Chaotic Behaviors Observed in the Asteroseismic Fitting of GD 358	309
<i>A. Bischoff-Kim and J. L. Provencal</i>	

Time-Series Spectroscopy and Photometry of the Helium Atmosphere Pulsating White Dwarf EC 20058–5234	315
<i>D. J. Sullivan</i>	
The Theoretical Instability Strip of V777 Her White Dwarfs	321
<i>V. Van Grootel, G. Fontaine, P. Brassard, and M.-A. Dupret</i>	
Photometric Variability and Spectroscopic Characterisation of White Dwarfs in Kepler 2 Fields	329
<i>I. P. Braker, M. R. Burleigh, M. R. Goad, S. L. Casewell, D. Buckley, J. B. Holberg, K. A. Lawrie, and M. A. Barstow</i>	
The Post-outburst Pulsations of GW Librae	335
<i>P. Chote, A. S. Mukadam, A. Aungwerojwit, P. Szkody, B. T. Gänsicke, D. J. Sullivan, S. Poshyachinda, D. E. Reichart, J. B. Haislip, and J. P. Moore</i>	
Contrasting Accreting White Dwarf Pulsators with the ZZ Ceti Stars	341
<i>A. S. Mukadam, P. Szkody, B. T. Gänsicke, and A. Pala</i>	
Making Sense Out of Pulsating Pre-ELM and ELM White Dwarfs	347
<i>G. Fontaine, A. Istrate, A. Gianninas, P. Brassard, and V. Van Grootel</i>	
Asteroseismology of the ZZ Ceti and DAZ GD 133	355
<i>J.-N. Fu, G. Vauclair, J. Su, T. Cang, C. Li, H. Xue, X.-J. Jiang, Y. Li, H. Niu, X. Zhang, F. Colas, N. Dolez, L. Fox Machado, R. Michel, M. Alvarez, and S.-L. Kim</i>	
Kepler Campaign 6 Observations of the DA Pulsating White Dwarf EC 14012–1446	359
<i>J. L. Provencal, J. J. Hermes, S. K. Kawaler, H. L. Shipman, A. Bischoff-Kim, and S. E. Thompson</i>	
A Search for Companions to the Pulsating sdB Star EC 20117–4014	363
<i>T. Otani, T. D. Oswalt, M. Amaral, and R. Jordan</i>	
Two New ZZ Ceti Stars from the LAMOST Survey	367
<i>J. Su, J. Fu, P. Khokhuntod, and G. Lin</i>	

Part VI. Structure, Stellar Evolution, and Fundamental Physics

Fundamental Physics from Observations of White Dwarf Stars	375
<i>M. B. Bainbridge, M. A. Barstow, N. Reindl, J. D. Barrow, J. K. Webb, J. Hu, S. P. Preval, J. B. Holberg, G. Nave, L. Tchang-Brillet, and T. R. Ayres</i>	
Sirius B: Confronting the Limits of our Understanding of White Dwarfs	383
<i>M. A. Barstow, S. R. G. Joyce, S. L. Casewell, J. B. Holberg, H. E. Bond, and M. R. Burleigh</i>	
<i>HST</i> Spectra of White Dwarfs and the Mass-Radius Relation	389
<i>S. R. G. Joyce, M. A. Barstow, S. L. Casewell, J. B. Holberg, and H. E. Bond</i>	
Mass-Radius Relation of Strongly Magnetized White Dwarfs	395
<i>P. Bera and D. Bhattacharya</i>	

Significantly Super-Chandrasekhar Limiting Mass White Dwarfs and their Consequences	401
<i>B. Mukhopadhyay, U. Das, A. R. Rao, S. Subramanian, M. Bhattacharya, S. Mukerjee, T. S. Bhatia, and J. Sutradhar</i>	
Magnetic Fields and the Crystallization of White Dwarfs	409
<i>J. Isern, E. García-Berro, B. Külebi, and P. Lorén-Aguilar</i>	
The Field White Dwarf Mass Distribution	415
<i>P.-E. Tremblay, J. Cummings, and J. S. Kalirai</i>	
White Dwarf Mass Distribution	421
<i>S. O. Kepler, D. Koester, A. D. Romero, G. Ourique, and I. Pelisoli</i>	
On the Evolution of Hydrogen-Deficient White Dwarfs	429
<i>M. E. Camisassa, L. G. Althaus, R. D. Rohrmann, E. García-Berro, and A. H. Córscico</i>	
On the Formation of DA White Dwarfs with Low Hydrogen Contents: Preliminary Results	435
<i>M. M. Miller Bertolami, L. G. Althaus, and A. H. Córscico</i>	
New Grid of Models for ELM White Dwarfs including Element Diffusion and Rotational Mixing	441
<i>A. G. Istrate</i>	
What's the Nature of sdA Stars?	447
<i>I. Pelisoli, S. O. Kepler, D. Koester, and A. D. Romero</i>	
sdA in SDSS DR12 are Overwhelmingly Not Extremely Low-Mass (ELM) White Dwarfs	453
<i>J. J. Hermes, B. T. Gänsicke, and E. Breedt</i>	
Post-AGB Evolution Much Faster than Previously Thought	457
<i>K. Gesicki, A. A. Zijlstra, and M. M. Miller Bertolami</i>	
Are All Magnetic White Dwarf Stars Massive?	461
<i>A. Nitta, S. O. Kepler, B. Kulebi, D. Koester, S. J. Kleinman, D. E. Winget, B. G. Castanheira, and A. H. Córscico</i>	

Part VII. White Dwarfs in Binaries, Cataclysmic Variables

Binarity in the Central Stars of Planetary Nebulae and its Relationship to Stellar Evolution: An Observational Perspective	469
<i>T. C. Hillwig, G. H. Jacoby, D. Jones, and O. De Marco</i>	
A Population Synthesis Study of White Dwarf–Main Sequence Binaries in the Galactic Disk	475
<i>R. Cojocar, A. Rebassa-Mansergas, and E. García-Berro</i>	
Observational Constraints on the Age-Metallicity Relation from White Dwarf–Main Sequence Binaries	481
<i>A. Rebassa-Mansergas, B. Anguiano, E. García-Berro, K. C. Freeman, R. Cojocar, C. J. Manser, A. F. Pala, B. T. Gänsicke, and X.-W. Liu</i>	

The Missing Magnetic White Dwarfs in Detached Close Binaries	489
<i>G. Tovmassian, D. Gonzalez-Buitrago, and S. Zharikov</i>	
The Flow Structure in the Vicinity of the Inner Lagrangian Point in Magnetic Cataclysmic Variables	495
<i>P. B. Isakova, A. G. Zhilkin, and D. V. Bisikalo</i>	
Correlated X-ray and Optical Variability in Intermediate Polars during their Outbursts	501
<i>V. V. Neustroev, S. Tsygankov, V. Suleimanov, and G. Sjoberg</i>	
NuSTAR Observations of the Dwarf Nova GK Persei in 2015: Comparison between Outburst and Quiescent Phases	509
<i>Y. Wada, T. Yuasa, K. Nakazawa, K. Makishima, T. Hayashi, and M. Ishida</i>	
M31N 2008-12a — The Remarkable Recurrent Nova in M31	515
<i>M. J. Darnley</i>	
White Dwarf Mass Estimation with X-ray Spectroscopy	523
<i>T. Hayashi</i>	
Detection of Double White Dwarf Binaries with Gaia, LSST and eLISA	529
<i>V. Korol, E. M. Rossi, and P. J. Groot</i>	
The Long-Term Behavior of Known and Suspected Novae	535
<i>A. Pagnotta</i>	
Light Curves Analysis of Deeply Eclipsed Dwarf Nova GY Cnc	543
<i>I. Voloshina and T. Khruzina</i>	
What Simulations Tell Us About White Dwarf Evolution in AM CVn Close Binaries	549
<i>M. M. Montgomery</i>	
New Southern Cataclysmic Variables: Discoveries from MASTER-SAAO	555
<i>D. A. H. Buckley, S. B. Potter, A. Kniazev, A. Kniazev, V. Lipunov, E. Gorbovskoy, and N. Tiurina</i>	
Flares Activity and Polarization States of White Dwarfs in Binary Star Systems	563
<i>D. Boneva and L. Filipov</i>	
Gaia14aae: the First Fully-Eclipsing AM CVn	567
<i>M. J. Green, T. R. Marsh, and D. T. H. Steeghs</i>	
V471 Tauri: Examining Eclipse Timing Variations with two Independent Clocks	571
<i>Z. P. Vanderbosch, J. C. Clemens, B. H. Dunlap, and D. E. Winget</i>	
<i>Author Index</i>	577