

# CURRICULUM VITAE

## LIZETTE GUZMAN-RAMIREZ

### Contact information

1 Langdale Rd.  
Victoria Park  
Manchester  
M14 5PQ  
UK

Room 3.205  
Jodrell Bank Centre for Astrophysics  
Alan Turing Building  
University of Manchester  
M13 9PL  
UK

Phone: +44 (0)7783811968 (mobile)  
E-mail: [lizette.ramirez@postgrad.manchester.ac.uk](mailto:lizette.ramirez@postgrad.manchester.ac.uk)  
<http://about.me/LizGuzRam>

### Personal details

Gender: Female  
Date of birth: 1st of May, 1984  
Place of birth: Saltillo, Mexico  
Nationality: Mexican  
Marital status: Single  
Full clean Mexican driving licence

### Academic experience

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| 2009–present | <b>Jodrell Bank Centre for Astrophysics</b> - University of Manchester, M13 9PL <ul style="list-style-type: none"><li>• PhD astrophysics</li><li>• Supervisor: Professor Albert Zijlstra</li><li>• Thesis Title: A MULTICAFETED EXPLORATION OF PLANETARY NEBULAE</li><li>• Submission date: November 2012</li></ul> |
| 2008–2009    | <b>Centre for Radioastronomy and Astrophysics</b> - UNAM, Mexico, 58089 <ul style="list-style-type: none"><li>• Got awarded the Excellence Scholarship for Postgraduate Studies Abroad from the Mexican Science and Technology Council (CONACyT) to do my PhD in the UK</li></ul>                                   |
| 2008–2009    | <b>Centre for Radioastronomy and Astrophysics</b> - UNAM, Mexico, 58089 <ul style="list-style-type: none"><li>• Research student while applying for the PhD grant to go abroad</li><li>• Supervisor: Dr. Yolanda Gomez</li></ul>  |
| 2006–2008    | <b>Centre for Radioastronomy and Astrophysics</b> - UNAM, Mexico, 58089 <ul style="list-style-type: none"><li>• MSc astrophysics</li><li>• Supervisor: Dr. Yolanda Gomez</li></ul>  |

2001–2005      **Universidad Autonoma de San Luis Potosi** - SLP, Mexico  
• First class Physics

## Membership of professional organisations

2011–present      Royal Astronomical Society

## Teaching and Organisational experience

2011–present      University of Manchester 3rd and 4th year undergraduate astrophysics laboratory experiments demonstrator - including night observing with a 10'' Schmidt-Cassegrain optical telescope.

2011–present      University of Manchester 3rd year undergraduate Spanish Tutor for students awarded with the Erasmus grant to do one year in Spain.

2009–2011      University of Manchester 1st year undergraduate physics laboratory experiments demonstrator.

## Relevant experience

- A wealth of personal observing experience totalling just under 40 nights at a variety of international facilities, including the 2.3m ANU Telescope at Siding Spring, Australia, the 2.1m Telescope at Kitt Peak, Arizona, 1.9m Radcliffe Telescope at the South African Astronomical Observatory. Experience with a variety of observing techniques ranging from long-slit spectrographs that give us high spectral-resolution spectroscopy to WiFeS which is a double-beam, image-slicing, integral-field spectrograph.
- Extensive experience also in radio, IR and optical data reduction. I have experience analysing radio data from the *VLA* using AIPS and CASA. IR data from *Spitzer* using SMART and SPICE. And for the optical data reduction using IRAF.
- Good experience in organising committees for national and international conferences. Part of the Local Organising Committee for the Royal Astronomy Society National Astronomy Meeting at the University of Manchester, March 2012. And part of the Local Organising Committee for the International Meeting: Asymmetric Planetary nebulae 5. Held in the Lake District, July 2010.
- Wide outreach experience, almost every year since the beginning of my undergrad I have participated in Summer Science Fairs, with hands-on experiments and talks for general public. During my MSc I helped coordinate the Summer School at the Centre for Radioastronomy and Astrophysics, UNAM, Mexico. During my PhD in the UK I have been involved in several Science Fairs, Star Nights and the Royal Society Summer Science Exhibition. I'm also a member of "The Jodcast" an astronomy podcast at the Jodrell Bank Centre for Astrophysics at the University of Manchester.
- Good working knowledge of IDL, BASH, L<sup>A</sup>T<sub>E</sub>X and unix-based operating systems.
- Fluent in Spanish and English languages.

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## RESEARCH

Planetary nebulae form at the end phase of stellar evolution. Stars with mass less than about 8 times the solar mass, eject almost all of their mass in a phase of catastrophic mass loss. The mass loss is important to the evolution of the host galaxy. In the Galaxy, around half the interstellar medium (ISM) is such recycled stellar gas. The ejecta are enriched with the products of nuclear burning: much of the carbon comes from this source, and most of the interstellar dust is formed in the these ejecta. Dust and carbon are essential to the formation of planets. PNe therefore are the best objects for observing dust formation and evolution that will enrich the ISM.

In the centre of our Milky Way, the Galactic Bulge, observations of PNe has showed that the simultaneous presence of oxygen and carbon-rich dust features is common, see Guzman-Ramirez, et al. 2011. Using satellites like Spitzer and HST we found a very strong correlation between the morphology of the PNe (70% of them are bipolar/multipolar showing a dense/compact torus) and the C-rich dust component. We use the Meudon chemistry code to prove that long C-chains can be formed in dense O-rich environments. The chemistry here is driven by a photon dominated region (PDR), where the CO molecule is dissociated. This is not the norm for the rest of the Galaxy components. Understanding why PNe in the Galactic Bulge are so different from the ones in the disk is a very young-still area of research. Some hypothesis trying to explain the bipolar and multipolar morphologies of PNe are that the central star that evolves into a PN is interacting with a star or planet. If this is true, it will imply that the incidence of binarity in the Galactic Bulge is higher than any other places. Binarity could also help explaining the mixed-chemistry phenomena observed.

My main research area has been focusing in understanding the mixed-chemistry phenomena. With more observations of C-rich and O-rich PN in the Galactic Bulge and in the disk, we would be able to draw a better picture of the processes occurring in these objects and explain better their differences. Questions like: if this is an external consequence (metallicity of the Galactic Bulge, density of stars) or an internal cause (binarity, age), formation of our Galactic Bulge and chemical evolution of dust in other galaxies.

## Short-term Research Stays

- Collaboration with Dr. Eric Lagadec analysing data from the VISIR instrument in the *VLT* - ESO, Garching, Germany from the 15th of April to 13th of May, 2012. The travel expenses shared between ESO and JBCA.
- Collaboration with Professor Quentin Parker and Dr. David Frew analysing PNe spectroscopic data - Macquarie University, Sydney, Australia from the 23rd of January to the 15th of March, 2012. Travel expenses covered by the Macquarie University.

## References

These persons are familiar with my professional qualifications and my character:

### Prof. Albert Zijlstra

Jodrell Bank  
Centre for Astrophysics  
University of Manchester  
Oxford Road  
M13 9PL  
UK

a.zijlstra@manchester.ac.uk  
+44 (0)1613063925

### Dr. Eric Lagadec

European Southern  
Observatory  
Karl-Schwarzschild-St 2  
85748  
Garching  
Germany

elagadec@eso.org  
+49 8932006932

### Prof. Laurent Loinard

Centre for Radioastronomy  
and Astrophysics  
UNAM  
Morelia  
Michoacán  
México

l.loinard@crya.unam.mx  
+52 5556232749

## Refereed publications

- **Carbon enrichment of the evolved stars in the Sagittarius dwarf spheroidal**  
McDonald, I., White, J. R., Zijlstra, A. A., **Guzman Ramirez, L.**, Szyszka, C., van Loon, J. Th. , Lagadec, E & Jones, O. C., 2012, MNRAS, arXiv:1209.2563
- **Discovery of planetary nebulae using predictive mid-infrared diagnostics**  
Parker, Q. A., Cohen, M., Stupar, M., Frew, D. J., Green, A. J., Bojicic, I., **Guzman-Ramirez, L.**, Sabin, L., & Vogt, F., 2012, MNRAS, arXiv:1208.416
- **A distance estimate based on angular expansion for the planetary nebula NGC 6881**  
**Guzman-Ramirez, L.**, Gomez, Y., Loinard, L., & Tafuya, D., 2011, MNRAS, 414, 3129
- **Carbon chemistry in Galactic bulge planetary nebulae**  
**Guzman-Ramirez, L.**, Zijlstra, A. A., Nichuimin, R., Gesicki, K., Lagadec, E., Millar, T. J., & Woods, Paul M. 2011, MNRAS, 414, 1667
- **Disk evaporation in a planetary nebula**  
Gesicki, K., Zijlstra, A. A., Szyszka, C., Hajduk, M., Lagadec, E., & **Guzman Ramirez, L.**, 2010, A&A, 514, 54
- **Expansion Parallax of the Planetary Nebula IC 418**  
**Guzman, L.**, Loinard, L., Gomez, Y. & Morisset, C., 2009, AJ, 138, 46
- **Ionization-bounded and Density-bounded Planetary nebulae**  
Rodriguez, L. F., Gomez, Y., & **Guzman, L.**, 2009, RMxAA, 45, 85
- **Expansion Parallax for the Compact Planetary Nebula M2-43**  
**Guzman, L.**, Gomez, Y., & Rodriguez, L. F. 2006, RMxAA, 42, 127

## Conference proceedings

- **Expansion Parallax of the Planetary Nebula IC 418**  
**Guzman, L.**, Loinard, L., Gomez, Y. & Morisset, C., XIII Latin American Regional IAU Meeting
- **Double Chemistry in Galactic Bulge Planetary nebulae**  
**Guzman-Ramirez, L.** & Zijlstra, A. A, Why Galaxies Care about AGB Stars II: Shining Examples and Common Inhabitants
- **Planetary nebulae Distances using the Radio Expansion Parallax Technique**  
**Guzman-Ramirez, L.**, The 41st Young European Radio Astronomers Conference
- **Double chemistry planetary nebulae**  
**Guzman-Ramirez, L.** & Zijlstra, A. A., Asymmetric Planetary nebulae 5
- **The distance to the Planetary Nebula M 2-43**  
**Guzman, Lizette**, Gomez, Yolanda & Rodriguez, Luis F. 2007, Asymmetrical Planetary nebulae 4

## Talks

- **Carbon chemistry in Galactic Bulge Planetary nebulae**  
Physical and chemical aspects of the late stages of stellar evolution,  
Warsaw, Poland - August 31st 2011
- **Carbon chemistry in Galactic Bulge Planetary nebulae**  
Planetary nebulae: An eye to the future,  
Tenerife, Spain - July 29th 2011
- **Planetary nebulae Distances using the Radio Expansion Parallax Technique**  
The 41st Young European Radio Astronomers Conference,  
Manchester, UK - July 20th 2011
- **Carbon chemistry in Galactic Bulge Planetary nebulae**  
National Astronomy Meeting,  
Llandudno, UK - April 21st, 2011
- **Carbon chemistry in Galactic Bulge Planetary nebulae**  
Exochemistry Meeting, Queen's University Belfast,  
Belfast, UK - December 11th, 2010
- **Expansion Parallax of the Planetary Nebula IC 418**  
XIII Latin American Regional IAU Meeting,  
Morelia, Mexico - November 10th, 2010

## Posters

- **Carbon chemistry in oxygen rich planetary nebulae**  
National Astronomy Meeting, 2012, Manchester, UK - March 27-30, 2012
- **Carbon chemistry in oxygen rich planetary nebulae**  
The Molecular Universe, IAU Symposium 280, Toledo, Spain - May 31st, 2011
- **Double chemistry planetary nebulae**  
Why Galaxies Care about AGB Stars II: Shining Examples and Common Inhabitants, Vienna, Austria - August 16-20, 2010
- **All you ever wanted to know about Planetary nebulae**  
VIII Symposium of Mexican Students at the University of Manchester, Manchester, UK - July 2nd, 2010
- **Double chemistry planetary nebulae**  
Asymmetric Planetary nebulae 5, The Lake District, UK - June 20-25th, 2010
- **The distance to the Planetary Nebula M 2-43**  
Asymmetrical Planetary nebulae 4, La Palma, Spain - June 18-22, 2007

## Public Talks

- **Life Cycle of Stars**

Bright Club Manchester 12: Space, Manchester, UK - March 27th 2012

- **Stellar life and death**

Bright Club Manchester 5: Consequences, Manchester, UK - February 11th 2011

- **Stars**

Bright Club Liverpool, Liverpool, UK - November 6th 2011