Data Scientist and PhD Astrophysicist,
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Dr. Robert Džudžar

Data Scientist & PhD Astrophysicists, who uses scientific knowledge and skills, and applies them to day-to-day problems. I am offering 4 years of active research experience in data processing, analysis and visualisation.

Experience

2020

Intern, *Astronomy Data and Computing Services (ADACS)*, Melbourne, Australia, 3 months.

My responsibility: Being a part of a team that follows Agile scrum methodology, I am leading development of a dynamical and interactive visualisation (using python and bokeh) and presenting/discussing progress with stakeholders. In addition, I am involved in web development with Django within a professional software development environment.

2016 – 2020

PhD research, *Centre for Astrophysics and Supercomputing*, Melbourne, Australia.

During my PhD candidature I gained experience with data mining, cleaning and analysis using **Python**. Obtained data from various databases, telescopes and computer simulations in a form of: catalogues, images, 3D data-cubes, and large output files from simulations.

2020

APAC Virtual Hackathon: Digital Defence Hack, *1st place with myself as team captain*, 21/22 Nobember.

As a team, we have successfully detected anomalies (fraud activities) within bank transactions. Tools used: Python, NEO4j, Tableau and Graphistry. Video presentation can be found here.

Educational Background

2016 – 2020

PhD Astrophysics, *Swinburne University of Technology, Centre for Astrophysics and Supercomputing*, Melbourne, Australia.

Scholarship: Swinburne University Postgraduate Research Awards (SUPRA)
Thesis: The evolution of galaxies in the HI-rich group environment
Supervisors: Prof. Virginia Kilborn, Dr. Sarah M. Sweet, Prof. Gerhardt Meurer

2014 – 2016

MSc Astrophysics, *AstroMundus International Master Program*, Innsbruck – Austria; Padova and Rome – Italy.

Scholarship: ErasmusMundus Scholarship, Cathegory A
Thesis: Dwarf galaxy evolution in the massive and dynamically active cluster A3266
Supervisor: Prof. Francine Marleau

2008 – 2014

BSc Physics, *University of Novi Sad, Faculty of Science, Department of Physics*, Novi Sad, Serbia.

Scientific field: Physics - Astronomy

Research Proposals

Observational projects as Principal Investigator (PI)

2020 **Australia Telescope Compact Array**, *Awarded 223.5 hours on a shared PI project "The lords of rings: HI gas and kinematic properties of ring galaxies".*

2018 **ANU 2.3m: Wide-Field Spectrograph (WiFeS)**, *Awarded three nights to observe galaxy: HIPASSJ0400-52:S1 - observations failed due to weather.*

2017 **Australia Telescope Compact Array**, *Awarded 87 hours to map HI content of group galaxies.*

2017 **Nobeyama 45-m**, *Awarded 45 hours to map ^{12}CO content of group galaxies..*

2017 **Very Large Array**, *Allocated 2h of observations.*

Observational projects as Co-Investigator (Co-I)

2019 **Australia Telescope Compact Array**, *Awarded 134 hours for project: HI galaxies with little or no star formation*, (Brown, Parkash, Dzudzar et al.).

2019 **ALMA**, *∼14 hours for: Molecular gas in HI eXtreme galaxies*, (Lutz, Brown, Catinella, Cortese, Denes, Dzudzar et al.).

Programming Project

2019 **Contributed project to National Optical Astronomy Observatory Data Lab**, *I developed a python script in jupyter notebook for an **interactive exploration** of multi-wavelength data-sets, published at* `https://datalab.noao.edu`*; the script is also available on my github.*

2019 **Screenplay analysis**, *Converting the raw screenplay from HTML to text and using **text processing** to extract, clean and analyse data. Outputs include: wordclouds, phrases, analysis of the character, episodes and seasons, sentiment analysis and interactive exploration of the characters number of lines with **bokeh**..*

Languages

Rusyn, Serbian	Native; Bilingual Proficiency	
English	Fluent	
Spanish	Basic	*Great Understanding, Good Speaking*
Slavic languages	Basic understanding	

Skills and Interests

Programming	**Python** - 4yr experience
	Python packages:
	Matplotlib, NumPy, Pandas, APLpy, Bokeh, SciPy, Astropy
	Scikit-learn, Django, Seaborn, ChainConsumer, H5py and mpi4py
Tools	Tableau, Github, LaTeX, Microsoft Office, Spyder, Jupyter Nobteook, Oracle

MIRIAD, CASA, SAODS9; 3DBarolo, Iraf, Source Extractor, GALFIT
OzSTAR - basic experience with sbatch and modules

Interests & Strengths

Data Mining, Visualisation, Data Analysis, Problem Solving, Big Data, Research
Data Visualisation, Research, Image and Data Processing, Data Mining
Communication, Organisation, Presentation, Team Work, Leadership
Critical Thinking, Project Management

Schools, Seminars, Courses

2012 – 2020 **Online Courses (mostly Coursera)**, ***Finished:*** *An introduction to Interactive Programming in Python, Galaxies and Cosmology, Dark Matter in Galaxies: The Last Mystery, Computing for Data Analysis, Introduction to Computer Science and Programming, Introduction to Data Science in Python, Applied Plotting, Charting & Data Representation in Python, Fundamentals of Visualization with Tableau, Data Visualizatio nwith Tableau Specialization (5 courses), Applied Machine Learning in Python, SQL for Data Science.*

2017 **Radio Astronomy School**, *Australia Telescope Compact Array*, Narrabri, Australia.

2017 **CAASTRO**, *Coding workshop*, Swinburne University, Australia.

2019 **Swinburne**, *Code testing workshop*, Swinburne University, Australia.

2020 **ADACS**, *ADACS astrocomp hack week: gave a flash talk about interactive visualisation*, AAO, Sydney, Australia.

Talks and Posters

2017 **Talk: "HI in Choir HIPASSJ2027-51"**, *at the Swinburne workshop "From Field To Clusters: HI as a tracer of galaxy evolution*, Melbourne, Australia.

2017 **Talk: "Gas-rich galaxies in the group environment"**, *Bolton and Student Symposium at the CSIRO*, Sydney, Australia.

2018 **Poster: "From SINGG to Choirs"**, *KIAA, Forum on Gas in Galaxies*, Beijing, China.

2018 **Poster: "From SINGG to Choirs"**, *ASA, Annual Scientific Meeting*, Melbourne, Australia.

2019 **Poster: "Choirs: gas-rich galaxy groups"**, *Australia-ESO joint conference*, Sydney, Australia.

2019 **Poster: "Galaxy ESO156-G029"**, *ASA, Annual Scientific Meeting*, Brisbane, Australia.

2019 **Talk: 'HI-rich haloes from the Dark Sage semi-analytic model"**, *RESOLVE meeting in US*, Remote attendance.

Event Organization

2012 – 2015 ***Supervisory Board***, *Member of the Member of the Supervisory Board of Astronomical Society of Novi Sad*, Serbia.

2012–2014 **Co-founder of "Novosadska skola astronomije"**, *School of Astronomy for general public, co-founder and lecturer*, Novi Sad, Serbia.

2018 ***LOC***, *Member of the Local Organizing Committee at ANITA Student School and Workshop*, Melbourne, Australia.

2018–2019 ***STAC***, *Member of the Swinburne Telescope Allocation Commitee for Keck Telescope*, Melbourne, Australia.

Teaching Experience

Teaching Assistant

2018–2019 **Discovering the Universe**, Laboratory tutor - one semester in 2017. and Tutor in one semester in 2018..

2019 **Electronics and electromagnetism**, Laboratory tutor.

2019 **eScience**, Laboratory tutor: Introduction to data science and R.

Outreach

2010–2015 **Educator at various Astronomy events:**, *Researchers' Night, Festival of Science, lecturer at Planetarium of Astronomical Society*, Novi Sad, Serbia.

2018–2020 **AstroTour guide**, *Swinburne University*.

Publications

[Džudžar et al., 2019a] Džudžar, R., Kilborn, V., Meurer, G., Sweet, S. M., et al. (2019a). The neutral hydrogen properties of galaxies in gas-rich groups. *MNRAS*, 483:5409–5425.

[Džudžar et al., 2019b] Džudžar, R., Kilborn, V., Murugeshan, C., Meurer, G., Sweet, S. M., and Putman, M. (2019b). Group pre-processing versus cluster ram-pressure stripping: the case of ESO156-G029. *MNRAS*, 490(1):L6–L11.

[Džudžar et al., 2021] Džudžar, R., Kilborn, V., Sweet, S. M., Meurer, G., Jarrett, T. H., and Kleiner, D. (2021). Environmental processing of galaxies in H I-rich groups. *MNRAS*, 500(3):3689–3710.

[Li et al., 2020] Li, J., Obreschkow, D., Lagos, C., Cortese, L., Welker, C., and Džudžar, R. (2020). Angular momentum-related probe of cold gas deficiencies. *MNRAS*, 493(4):5024–5037.

[Murugeshan et al., 2019] Murugeshan, C., Kilborn, V., Obreschkow, D., Glazebrook, K., Lutz, K., Džudžar, R., and Dénes, H. (2019). Angular momentum regulates H I gas content and H I central hole size in the discs of spirals. *MNRAS*, 483:2398–2412.