

Abhijeet Borkar

POSTDOC AT ASTRONOMY INSTITUTE OF THE CZECH ACADEMY
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EXPERIENCE

CURRENT, FROM AUGUST 2016

Contact Scientist at the Czech Node of the European ALMA Regional Center

As a member of the Czech Node, I provide scientific and technical support for ALMA users for proposal preparation, observation planning, data analysis, and quality assurance. I am also involved in development of analysis scripts, organising workshops for ALMA users, and science popularisation.

SEPTEMBER 2013 – MAY 2015

Leadership

Student Representative for the International Max Planck Research School (IMPRS) at Max Planck Institute for Radio Astronomy (MPIfR) Bonn and Cologne, Germany.

PROJECTS

2019 – ONGOING

Dual Active Galactic Nuclei

We aim to study close dual AGN systems using high resolution and sensitivity observations at sub-millimeter, infrared, visible and X-ray wavelength to evaluate the impact of gas content, morphology, and mass ratio on AGN dynamics.

2019 – ONGOING

Unification of Black Holes across the Mass Scale

We investigate the inherent similarities and differences between AGN & XRB, and what can be scaled up or down to understand these two classes of black holes, with the primary objective of comparing various states & properties of XRBs with different classes of AGN.

2018 – ONGOING

Multi-phase environment of Centaurus A

We studied the multi-phase gas distribution in the close vicinity of the central SMBH by combining the high resolution ALMA and Chandra observations and simulations of the gas & dust in the central 500 pc of the Centaurus A galaxy to examine what physical processes are responsible for multi-phase gas equilibrium.

2012 – 2016

The Flaring Activity of Sagittarius A*

We observed the supermassive black hole at the Center of the Milky Way, Sagittarius A*, from 2010 – 2014 at 86 GHz using ATCA to study its intraday variability that results in flaring. We used structure function analysis and Bayesian blocks representation to identify flaring events, and the adiabatically expanding plasmon model to describe the flare parameters.

2013 – 2018

SiO maser sources in the Central Parsec of the Galactic Center

We used 3 mm observations of Galactic Center taken with ATCA and ALMA between 2010 – 2015. Using the SiO maser transition lines, we detected 21 stellar sources within 1 parsec of Sagittarius A*. We analyse these sources and study the variability of the maser emission & calculate their proper motions.

EDUCATION

2012 – 2015

Ph.D. in Experimental Physics

MAGNA CUM LAUDE

I. Physikalisches Institut

Universität zu Köln, Cologne, Germany

2010 – 2012

M.Sc. in Physics

Department of Physics

University of Pune, Pune, India

2007 – 2010

B. Sc. in Physics

FIRST CLASS WITH DISTINCTION

Fergusson College

University of Pune, Pune, India

SCHOLARSHIPS & GRANTS

2019 – 2021

Junior Project Grant, Co-I

Grant Agency of Czech Republic

2014 – 2015

Scholarship of the MPIfR

MPIfR, Bonn, Germany

2012 – 2014

Scholarship of the IMPRS

MPIfR, Bonn, Germany

2013

Travel Grant of COST Action MP905

JUNE – SEPT

European Cooperation in Science & Technology

SKILLS

OBSERVATIONS

86 GHz ATCA observations of Galactic Center, 2013 – 2014

COMPUTERS

Python, Fortran90, L^AT_EX, MIRIAD, CASA, DPUSER, Ubuntu, Linux

TEACHING

Introduction to Programming with Python, 2017 – 2018

OUTREACH

Contributed content and comments for various newspapers and magazines.

2016 – 2019

Curating @astrotweeps on Twitter.

FEBRUARY 2019 & JUNE 2016

Part of team of young researchers writing scientific and educational articles for school children in rural India.

2014 – 2015

Regular writer on Quora, a Questions & Answers website, where I frequently write about Astronomy and was awarded "Top Writer" in 2015 & 2016.

2014 – 2016

Member of the Astro Club at Fergusson College, Pune, a Physics & Astronomy club involved in outreach activities.

2007 – 2010

Relating Star Formation Rate in the Galaxies with the Gas Distribution

Using the Kennicutt-Schmidt relation, we calculated the star formation rate density for local galaxy population and for Damped Lyman Alpha systems. We also tried to address the discrepancy between the observed and expected star formation rate density. This project was part of my Masters' thesis.

MAY – JULY 2011

Modelling Gas Distribution in Local Dwarf Galaxies

The column density distribution of the neutral hydrogen (HI) was calculated for local dwarf galaxies for 73 galaxies from Faint Irregular Galaxies GMRT Survey (FIGGS) Sample. This project was completed under the Visiting Students' Research Program at NCRA-TIFR, Pune, India.

CONFERENCES AND WORKSHOPS

European Week of Astronomy and Space Science (EWASS 2019) at Lyon, France.

23 – 28 JUNE, 2019

Multifrequency Behaviour of High Energy Cosmic Sources - XIII (Multif2019) at Palermo, Italy

3 – 8 JUNE, 2019

10 Years of Czech Republic in ESA at Prague, Czech Republic.

12 – 15 NOVEMBER, 2018, LOC

Are AGN Special? at Durham, United Kingdom.

30 JULY – 3 AUGUST, 2018

European Week of Astronomy and Space Science (EWASS 2017) at Prague, Czech Republic.

26 – 30 JUNE, 2017

Colgone-Prague-Kiel Meeting 2017 at Cologne, Germany.

8 – 10 MAY, 2017

Joint pre-Cycle 5 ALMA workshop at Astronomy Institute of Czech Academy of Sciences, Prague, Czech Republic.

6 – 7 APRIL, 2017

Colgone-Prague-Kiel Meeting 2016 at Cologne, Germany.

30 NOVEMBER – 2 DECEMBER, 2016

9th IRAM Millimeter Interferometry School at IRAM, Grenoble, France.

10 – 14 OCTOBER, 2016

8th Finding Extreme Relativistic Objects (FERO) Meeting at Hnanice, Czech Republic.

11 – 15 SEPTEMBER, 2016

Annual Meeting of the Astronomische Gesellschaft at the University of Kiel, Kiel, Germany

14 – 18 SEPTEMBER, 2015

The Galactic Center Black Hole Laboratory at Instituto des Astrofísica de Andalusia, Granada, Spain.

19 – 22 NOVEMBER, 2013

DST-SERC Winter School in Nonlinear Dynamics at the Indian Institute for Science Education and Research, Pune, India

4 – 24 DECEMBER, 2011

Visiting Students Research Programme (VSRP-2011) at National Centre for Radio Astrophysics, Pune, India

9 MAY – 8 JULY, 2011

PUBLICATIONS

- [1] Borkar, A. *et al.* Multi-phase environment of Centaurus A galaxy. *ArXiv e-prints* (2020). 2006 . 01099.
- [2] Borkar, A. *et al.* Observations of the 86 GHz SiO maser sources in the Central Parsec of the Galactic Centre. *ArXiv e-prints* (2019). 1909 . 13753.
- [3] Eckart, A. *et al.* Nuclear Activity and the Conditions of Star-formation at the Galactic Center. *ArXiv e-prints* (2017). 1709 . 08963.
- [4] Moser, L. *et al.* Approaching hell's kitchen: Molecular daredevil clouds in the vicinity of Sagittarius A*. *A&A* **603**, A68 (2017). 1603 . 00801.
- [5] Subroweit, M. *et al.* Submillimeter and radio variability of Sagittarius A*. A statistical analysis. *A&A* **601**, A80 (2017).
- [6] Moser, L. *et al.* Molecular gas in the immediate vicinity of Sgr A* seen with ALMA. In Crocker, R. M., Longmore, S. N. & Bicknell, G. V. (eds.) *The Multi-Messenger Astrophysics of the Galactic Centre*, vol. 322 of *LAU Symposium*, 129–132 (2017). 1707 . 02951.
- [7] Borkar, A. *et al.* Monitoring the Galactic Centre with the Australia Telescope Compact Array. *MNRAS* **458**, 2336–2349 (2016). 1605 . 00424.
- [8] Moser, L. *et al.* Approaching hell's kitchen: molecular daredevil clouds in the vicinity of Sgr A*. *ArXiv e-prints, submitted to A&A* (2016). 1603 . 00801.
- [9] Valencia-S., M. *et al.* Monitoring the Dusty S-cluster Object (DSO/G2) on its Orbit toward the Galactic Center Black Hole. *ApJ* **800**, 125 (2015). 1410 . 8731.
- [10] Eckart, A. *et al.* The infrared K-band identification of the DSO/G2 source from VLT and Keck data. In Sjouwerman, L. O., Lang, C. C. & Ott, J. (eds.) *LAU Symposium*, vol. 303 of *LAU Symposium*, 269–273 (2014). 1311 . 2753.
- [11] Jalali, B. *et al.* Star formation in the vicinity of nuclear black holes: young stellar objects close to Sgr A*. *MNRAS* **444**, 1205–1220 (2014). 1408 . 0005.
- [12] Shahzamanian, B. *et al.* Polarized light from Sagittarius A* in the near-infrared K_s-band. *A&A* **576**, A20 (2015). 1411 . 0006.
- [13] Eckart, A. *et al.* The Center of the Milky Way from Radio to X-rays. *ArXiv e-prints* (2015). 1501 . 02164.
- [14] Jalali, B. *et al.* Young stellar objects close to Sgr A*. In Sjouwerman, L. O., Lang, C. C. & Ott, J. (eds.) *LAU Symposium*, vol. 303 of *LAU Symposium*, 144–146 (2014). 1311 . 4881.
- [15] Moser, L. *et al.* Sgr A West in the light of molecules: cold and dense gas east of the circumnuclear disk. In Sjouwerman, L. O., Lang, C. C. & Ott, J. (eds.) *LAU Symposium*, vol. 303 of *LAU Symposium*, 86–88 (2014).
- [16] Eckart, A. *et al.* The Galactic Center as a paradigm for low-luminosity nuclei? In *Proceedings of Nuclei of Seyfert galaxies and QSOs - Central engine & conditions of star formation (Seyfert 2012). 6-8 November, 2012.*, 4 (2012). 1311 . 2743.