

Arvind Singh Rajpurohit

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Physical Research Laboratory
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Date of Birth: 16-04-1985
Marital status: Divorced

Research Interest Modelling the atmospheric properties of Very Low Mass stars and brown dwarfs using a radiative transfer code called PHOENIX. The majority of my work involves spectroscopic follow-up observations (both high and low resolution) from world-class observing facilities of these faintest components of our Milky Way galaxy and comparing them with state-of-the-art atmospheric models to determine their fundamental physical properties. I am also interested in studying the magnetic activity in M dwarfs with masses below $0.35M_{\odot}$ where they become fully convective and, unlike solar-type stars, lack the tachocline region, which is thought to be essential for their magnetic field generation. More recently, I have started working on characterizing the atmospheric properties of ultra-hot Jupiters.

Education 2005: *Bachelor of Science (B.Sc)*
Physics, Maths and Electronics
Jai Narain Vyas University, Jodhpur, India

2007: *Master of Science (M.Sc)*
Applied Physics
Faculty of Technology and Engineering
M.S. University of Baroda, Vadodara, India

2013 : *Doctor of Philosophy in Astrophysics (Ph.D)*
Title : Low-mass stars as tracers of Milky Way populations : investigating the effect of metallicity in cool atmospheres
Institut UTINAM CNRS 6213, Observatoire des Sciences de l'Univers THETA Franche-Comté Bourgogne, Univ. Bourgogne Franche-Comté & Observatoire de Besançon, France

Observing experience During my carrier, I had an opportunity to utilize a variety of techniques employed in astronomy and gain substantial observing experience with some of the world's largest astronomical telescopes.

Work Experience 04/2008–04/2010 : *Project Associate*
Physical research Laboratory, Ahmedabad, India

10/2010–10/2013 : *Graduate student*
Observatoire de Besançon, Besançon, France

02/2014–11/2014 : *CNRS Postdoctoral Fellow*
Laboratoire d' Astrophysique de Marseille (LAM), Marseille, France

11/2014–11/2015 : *CNES Postdoctoral Fellow*
Laboratoire d' Astrophysique de Marseille (LAM), Marseille, France

12/2015–12/2020 : *Reader*
Physical Research Laboratory, Ahmedabad, India

01/2021–present : *Assist. Prof.*
Physical Research Laboratory, Ahmedabad, India

**Involved and
completed
Projects**

Programme ID : 089.D-0176 (PI)
Confronting newest M dwarf model atmospheres with medium-resolution Near-Infrared spectra: Determination of their physical parameters and the effect of metallicity on the cool atmosphere, ISAAC@VLT

Programme ID : 290.C-5036 (PI)
Star formation and origin of the Central Molecular Zone: L-band spectroscopy of SPITZER YSO candidates, ISAAC@VLT

Programme ID : 092.D-0600 (PI)
Population II counterparts: The diversity of the dust properties and cloud physics in the atmosphere of cool subdwarfs using recent atmosphere models, XSHOOTER@VLT

Programme ID : 087.D-0586A (CoI)
Investigating the effects of metallicity in cool atmospheres, UVES@VLT

Programme ID : 087.D-0586B (CoI)
Investigating the effects of metallicity in cool atmospheres, UVES@VLT

**Technical and
Instrumental
Development**

CoI of optical spectro-polarimeter for 2.5 m telescope
(PI: Dr. M. K. Srivastava, A&A Division PRL)

**Administrative
duties**

Member of time allocation committee for PRL 1.2m telescope for three years until 2022
Doctroal student representative, Administrative council, Institut UTINAM, CNRS, 2012, France

Publication in referred Journal: 28, Conference Proceedings: 13, NASA-ADS citations: 1159, h-index: 18, Google citations: 1476, h-index:19

**Referred
Publications**

1. W. J. Cooper, H. R. A. Jones, R. L. Smart, S. L. Folkes, J. A. Caballero, ... including (**A. S. Rajpurohit**) et. al, “The Gaia Ultra Cool Dwarf Sample – IV. GTC/OSIRIS optical spectra of Gaia L dwarfs”, under review in MNRAS
2. Vipin Kumar, **A. S. Rajpurohit**, Mudit K. Srivastava and José G. Fernández-Trincado, “Exploring the short-term variability of H α and H β emissions in a sample of M dwarfs”, 2023, 2023MNRAS.524.6085K
3. Rajpurohit, K.; Osinga, E.; Brienza, M.; Botteon, A.; ... including (**A. S. Rajpurohit**) et. al, “Deep low-frequency radio observations of Abell 2256. II.

The ultra-steep spectrum radio halo”, 2023, [2023A&A...669A...1R](#), [A&A Cover Page](#), [Press release by CHANDRA](#), [Press release by NASA](#), [Video by Chandra X-ray Observatory](#)

4. Kumar, Vipin; Srivastava, Mudit K.; Dixit, Vaibhav; Mistry, Bhavesh; Lad, Ke-vikumar; Patel, Ankita; **Rajpurohit, Arvind S**, “Designs of Mt. Abu faint object spectrograph and camera - echelle polarimeter (M-FOSC-EP) and its prototype: spectro-polarimeters for PRL 1.2m and 2.5m Mt. Abu Telescopes, India”, 2022, [2022SPIE12184E..5BK](#)
5. Rajpurohit, K.; van Weeren, R. J.; Hoeft, M.; Vazza, F.; ... including (**A. S. Rajpurohit**) et. al, “Deep Low-frequency Radio Observations of A2256. I. The Filamentary Radio Relic”, 2022, [2022ApJ...927...80R](#),[NOVA Fea-tured Image : Deep Imaging of a Radio Relic](#)
6. Rajpurohit, K.; Hoeft, M.; Wittor, D.; van Weeren, R. J.; ...including (**A. S. Rajpurohit**) et. al, “Turbulent magnetic fields in the merging galaxy cluster MACS J0717.5+3745”, 2022, [2022A&A...657A...2R](#), [A&A Cover Page](#)
7. Rajpurohit, K.; Vazza, F.; van Weeren, R. J.; Hoeft, M.; ...including (**A. S. Rajpurohit**) et. al, “Dissecting nonthermal emission in the complex multiple-merger galaxy cluster Abell 2744: Radio and X-ray analysis”, 2021, [2021A&A...654A..41R](#), [A&A Cover Page](#)
8. Srivastava, Mudit K.; Kumar, Vipin; Dixit, Vaibhav; Patel, Ankita; Jangra, Mohanlal; **Rajpurohit, A. S.**; Mathur, S. N, “Design and development of Mt.Abu faint object spectrograph and camera - Pathfinder (MFOSC-P) for PRL 1.2m Mt. Abu Telescope”, 2021, [2021ExA...tmp...45S](#)
9. Rajpurohit, K.; Brunetti, G.; Bonafede, A.; van Weeren, R. J, ...including (**A. S. Rajpurohit**) et. al, “Physical insights from the spectrum of the radio halo in MACS J0717.5+3745”, 2021, [2021A&A...646A.135R](#)
10. Rajpurohit, K.; Wittor, D.; van Weeren, R. J.; Vazza, F., ...including (**A. S. Rajpurohit**) et. al, “Understanding the radio relic emission in the galaxy cluster MACS J0717.5+3745: Spectral analysis”, 2021, [2021A&A...646A..56R](#), [A&A Cover Page](#)
11. Subhajeet Karmakar, **A. S. Rajpurohit**, F. Allard, D. Homeier, “Discovery of new low-mass companions to M-dwarfs LP 1033-31 and LP 877-72”, 2020, [MNRAS.498..737K](#)
12. **Rajpurohit, A. S.**, Allard, F., Homeier, D., Mousis, O., Rajpurohit, S., ”Day-side thermal inversion in the atmosphere of WASP-19b”, [2020A&A...642A..39R](#)
13. **A. S. Rajpurohit**, Vipin Kumar, Mudit K. Srivastava, F. Allard, D. Homeier, Vaibhav Dixit and Ankita Patel, ”First Results from MFOSC-P : Low Resolution Optical Spectroscopy of a Sample of M dwarfs within 100 parsecs”, 2020, [MNRAS, 492, 5844-5852](#)

14. **A. S. Rajpurohit**, F. Allard, S. Rajpurohit, R. Sharma, G. D. C. Teixeira, O. Mousis, R. Kamlesh, “Exploring the stellar properties of M Dwarfs with High-resolution spectroscopy from the Optical to the Near-Infrared”, **2018A&A...620A.180R**
15. Fouqué, Pascal; Moutou, Claire; Malo, Lison; Martioli, Eder; Lim, Olivia; **Rajpurohit, Arvind**; Artigau, Etienne; Delfosse, Xavier; Donati, Jean-François, et. al, “SPIRou Input Catalogue: global properties of 440 M dwarfs observed with ESPaDOnS at CFHT”, **2018MNRAS.475.1960F**
16. **Rajpurohit, A. S.**; Allard, F.; Teixeira, G. D. C.; Homeier, D.; Rajpurohit, S.; Mousis, O., “Photospheric properties and fundamental parameters of M dwarfs”, **2018A&A...610A..19R**
17. Bayo, A.; Barrado, D.; Allard, F.; Henning, T.; Comerón, F.; Morales-Calderón, M.; **Rajpurohit, A. S.**; Peña Ramírez, K.; Beamín, J. C., “Physical parameters of late M-type members of Chamaeleon I and TW Hydrae Association: dust settling, age dispersion and activity”, **2017MNRAS.465..760B**
18. **Rajpurohit, A. S.**; Reylé, C.; Allard, F.; Homeier, D.; Bayo, A.; Mousis, O.; Rajpurohit, S.; Fernández-Trincado, J. G., “Spectral energy distribution of M-subdwarfs: A study of their atmospheric properties”, **2016A&A...596A..33R**
19. Lillo-Box, J.; Demangeon, O.; Santerne, A...(including **Rajpurohit, A.**) et. al, “K2-30 b and K2-34 b: Two inflated hot Jupiters around solar-type stars”, **2016A&A...594A..50L**
20. Santerne, A.; Hébrard, G.; Lillo-Box, J...(including **Rajpurohit, A.**) et. al, “K2-29 b/WASP-152 b: An Aligned and Inflated Hot Jupiter in a Young Visual Binary”, **2016ApJ...824...55S**
21. Santerne, A.; Moutou, C.; Tsantaki, M...(including **Rajpurohit, A.**) et. al, “SOPHIE velocimetry of Kepler transit candidates. XVII. The physical properties of giant exoplanets within 400 days of period”, **2016A&A...587A..64S**
22. Barros, S. C. C.; Almenara, J. M.; Demangeon, O...(including **Rajpurohit, A.**) et. al, “Photodynamical mass determination of the multiplanetary system K2-19”, **2015MNRAS.454.4267B**
23. Armstrong, David J.; Santerne, Alexandre; Veras, Dimitri...(including **Rajpurohit, A.**) et. al, “One of the closest exoplanet pairs to the 3:2 mean motion resonance: K2-19b and c”, **2015A&A...582A..33A**
24. Mousis, O.; Hueso, R.; Beaulieu, J.-P.; Bouley, S...(including **Rajpurohit, A.**) et. al, “Instrumental methods for professional and amateur collaborations in planetary astronomy”, **2014ExA....38...91M**
25. **Rajpurohit, A. S.**; Reylé, C.; Allard, F.; Scholz, R.-D.; Homeier, D.; Schultheis, M.; Bayo, A., “High-resolution spectroscopic atlas of M subdwarfs. Effective

temperature and metallicity”, **2014A&A...564A..90R**

26. Reyl , C.; Delorme, P.; Artigau, E.; Delfosse, X.; Albert, L.; Forveille, T.; **Rajpurohit, A. S.**; Allard, F.; Homeier, D.; Robin, A. C., “CFBDS J111807-064016: A new L/T transition brown dwarf in a binary system”, **2014A&A...561A..66R**
27. Deshpande, R.; Blake, C. H.; Bender, C. F.; Mahadevan, S.; Terrien, R. C.; Carlberg, J. K.; Zasowski, G.; Crepp, J.; **Rajpurohit, A. S.**; Reyl , C.; Nidever, D. L.; Schneider, D. P.; Allende Prieto, C.; Bizyaev, D.; Ebelke, G.; Fleming, S. W.; Frinchaboy, P. M.; Ge, J.; Hearty, F.; Hern andez, J. Malanushenko, E.; Malanushenko, V.; Majewski, S. R.; Marchewski, R.; Muna, D.; Oravetz, D.; Pan, K.; Schiavon, R. P.; Shetrone, M.; Simmons, A.; Stassun, K. G.; Wilson, J. C.; Wisniewski, J. P., “The SDSS-III APOGEE Radial Velocity Survey of M Dwarfs. I. Description of the Survey and Science Goals”, **2013AJ....146..156D**
28. **Rajpurohit, A. S.**; Reyl , C.; Allard, F.; Homeier, D.; Schultheis, M.; Bessell, M. S.; Robin, A. C., “The effective temperature scale of M dwarfs”, **2013A&A...556A..15R**
29. **Rajpurohit, A. S.**; Reyl , C.; Schultheis, M.; Leinert, Ch.; Allard, F.; Homeier, D.; Ratzka, T.; Abraham, P.; Moster, B.; Witte, S.; Ryde, N., “The very low mass multiple system LHS 1070. A testbed for model atmospheres for the lower end of the main sequence”, **2012A&A...545A..85R**
30. Jain, Rajmal; Awasthi, Arun Kumar; **Rajpurohit, Arvind Singh**; Aschwanden, Markus J., “Energy-Dependent Timing of Thermal Emission in Solar Flares”, **2011SoPh..270..137J**

**Conference
proceedings**

1. Kumar, Vipin; **Rajpurohit, A. S.**; Srivastava, Mudit K., “Exploring the short-term variability of H-alpha and H-beta emissions in a sample of M Dwarfs”, 2022csss.confE.180K ”, 2023
2. Karmakar, Subhajeet; **Rajpurohit, Arvind S.**; Allard, France; Homeier, Derek, “Very Low Mass binaries LP 1033-31 and LP 877-72: Discovery and characterization”, **2023AAS...24134702K**
3. Karmakar, Subhajeet; **Rajpurohit, Arvind S.**; Allard, France; Homeier, Derek, “Adaptive optics investigation of two VLM binaries”, **2022csss.confE..19K**
4. Barros, S. C. C.; Almenara, J. M.; Demangeon, O...(including **Rajpurohit, A.**) et. al, “K2-19, The first K2 multi-planetary system showing TTVs”, **2016IAUFM..29A..51 B**
5. **Rajpurohit, A. S.**; Reyl , C.; Schultheis, M.; Allard, F., “High resolution spectroscopy of M subdwarfs”, **2013sf2a.conf..259R**

6. Allard, F.; Homeier, D.; Freytag, B.; Schaffenberger, W.; **Rajpurohit, A. S.**, “Progress in modeling very low mass stars, brown dwarfs, and planetary mass objects”, **2013MSAIS..24..128A**
7. **Rajpurohit, A. S.**; Reylé, C.; Schultheis, M.; Allard, F.; Scholz, R.; Homeier, D., “High-resolution spectroscopy of M subdwarfs”, **2013MmSAI..84.1104R**
8. Reylé, C.; Delorme, P.; Artigau, E.; Delfosse, X.; Albert, L.; Forveille, T.; **Rajpurohit, A. S.**; Allard, F.; Homeier, D.; Robin, A. C. “A M/T dwarf binary from the Canada-France Brown Dwarf Survey: probing the L/T transition”, **2013MmSAI..84.1050R**
9. **Rajpurohit, A. S.**; Reylé, C.; Schultheis, M.; Allard, F.; Scholz, R.; Homeier, D., “Stellar parameters of M dwarfs from low and high-resolution spectra together with new model atmospheres”, **2012sf2a.conf..383R**
10. **Rajpurohit, A. S.**; Reylé, C.; Schultheis, M.; Leinert, C.; Allard, F., “The physical parameters of the low-mass multiple system LHS1070 from Spectral synthesis analysis”, **2011sf2a.conf..339R**
11. Reylé, C.; **Rajpurohit, A. S.**; Schultheis, M.; Allard, F., “The Effective Temperature Scale of M Dwarfs from Spectral Synthesis”, **2011ASPC..448..929R**
12. **Rajpurohit, A. S.**; Reylé, C.; Schultheis, M.; Allard, F., “Validation of M-dwarf atmosphere models and effective temperature scale of M dwarfs”, **2010sf2a.conf..275R**
13. Jain, Rajmal; **Rajpurohit, Arvind Singh**, Aggarwal, M.; Jamwal, R.; Awasthi, A., “Energy-Dependent Timing of Thermal Emission in Solar Flares”, **2010ASSP...19..465J**