MICHAEL ABDUL-MASIH, PHD

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RESEARCH POSITIONS

La Caixa Junior Leader Fellow - Instituto de Astrofísica de Canarias, Tenerife, Spain *Dec. 2023 - Present*

ESO Postdoctoral Fellow - European Southern Observatory, Santiago, Chile *Oct. 2020 - Dec. 2023*
XSHOOTER Instrument fellow
As an ESO fellow, 50% of my contract was dedicated to Observatory duties including 80 nights per year as support astronomer, improving the data reduction pipelines, performing observational feasibility assessments, and serving as night shift coordinator.

PhD student - Institute of Astronomy, KU Leuven, Leuven, Belgium *Sep. 2016 - Sep. 2020*

EDUCATION

PhD in Astronomy and Astrophysics - Institute of Astronomy, KU Leuven *Sep. 2016 - Sep. 2020*
Thesis Title: Spectroscopy of spherically distorted massive stars: testing internal mixing and stellar evolution
Defense date: 26 May 2020
PhD Supervisor: Hugues Sana

M.Sc. in Astrophysics - Rensselaer Polytechnic Institute *Aug. 2014 - Dec. 2015*
Overall GPA: 3.89/4.0

B.Sc. in Astronomy & Astrophysics, Biochemistry - Villanova University *Aug. 2010 - May 2014*
Minors in Business, Physics
Overall GPA: 3.39/4.0

GRANTS AND ACCEPTED OBSERVING PROPOSALS

La Caixa Junior Leader Fellowship - independent postdoctoral fellowship	€305.100,00
ESO Chile Fellowship - independent postdoctoral fellowship	€280.000,00
SSDF Project grant - funding to hire summer student	€6.100,00
MIAPbP visiting researcher grant - funding to attend the invitational MIAPbP workshop	€1.600,00
ESO 114.27K3 - magnetism in massive interacting overcontact binaries	FORS2 - 3 nights
ESO 114.27D9 - galactic massive overcontact binaries	UVES - 14.4 hours
CAT 47-Mercator2/24B - massive semi-detached binaries	HERMES - 5 nights
ESO 113.26KE - Be stars as tracers of previous binary interactions	ESPRESSO - 59 hours
ESO 113.26B9 - (dPI) line profile variability of massive rapid rotator ζ Oph	ESPRESSO - 3.8 nights
ESO 113.26K9 - magnetism in massive interacting overcontact binaries	HARPS - 5 nights
CHARA 2024a-M15/NOIR5 - triples around massive contact binaries	MIRC-X/MYSTIC - 1.5 nights
ESO 112.25PM, 113.26K8 - triples around massive contact binaries	GRAVITY - 12 hours
ESO 0103.D-0237 - massive overcontact binaries in the SMC	XSHOOTER - 12 hours
MERCATOR 2017-2020 - distorted massive stars	HERMES - 161.4 hours

TALKS AND SEMINARS IN THE PAST 2 YEARS

Invited Speaker - Binary and Multiple stars in the Era of (...) *Litomyšl, Czech Republic - Sept. 2024*

Invited Seminar - Centro de Astrobiología *Madrid, Spain - May 2024*

Invited Seminar - Universitat de Barcelona *Barcelona, Spain - March 2024*

Invited Speaker - EAS 2023 S11: Stellar interactions: contact binary stars (...) *Krakow, Poland - July 2023*

Contributed Speaker - 3, 2, 1: Massive Triples, Binaries and Mergers *Leuven, Belgium - July 2023*

Invited Speaker – IAU G2 Conference seminar series *Online - May 2023*

Contributed Speaker - Impact of binaries on stellar evolution *Garching, Germany - Nov. 2022*

Contributed Speaker - Fundamental role of stellar multiplicity (...) *Garching, Germany - Nov. 2022*

Invited Seminar - Université de Genève *Geneva, Switzerland - June 2022*

Invited Seminar - Max Planck Institute for Astrophysics *Garching, Germany - Apr. 2022*

OPEN SOURCE CODES AND DEVELOPMENT COLLABORATIONS

SPAMMS (PI) [GitHub link] - Python library to produce synthetic spectra for distorted massive stars

PyGA (PI) [GitHub link] - Python implementation of a genetic algorithm optomizer

Binaries in VR (PI) [GitHub link] - VR application written in UNITY to demonstrate orbital mechanics for outreach purposes

PHOEBE Development Team [link] - Python library to fit the light curves of eclipsing binary stars. I help to develop and maintain the code as well as organize yearly workshops for new users.

XSHOOTER Instrument Operations Team [link] - Spectrograph on ESO's VLT. I was a member of the Instrument Operations Team from October 2020 until December 2023. I was responsible for improving the flux calibration pipeline

TEACHING AND SUPERVISION

Summer internship supervision - Supervised a masters student for a 3 month internship at ESO *2023*

PhD student supervision - co-supervised PhD student Gabriel Szasz for a 1 year project at ESO *2022-2023*

PHOEBE Workshop Instructor - summer school focused on modelling eclipsing binary stars *2021-2023*

Lecture - Stellar spectroscopy *ESO Lecture Series - Feb. 2023*

Lecture - Modelling of eclipsing binaries *Binary Stars MSc. course, Universidad de Valparaíso - Dec. 2022*

Masters Research Project supervision – supervisor of 5 students in total *2017-2019*

Bachelor Thesis supervision - supervisor of 2 students in total *2018-2019*

Teaching Assistant for Masters Courses - 3 courses in total *2016-2018*
Interstellar Medium, General Relativity, Star and Planet Formation

OUTREACH

Stellar Couples [link] - Collaboration with the Space y Chile YouTube channel (>400 views) *Oct. 2022*

Astronomía al Parque - Discussed binary stars in a public park in Spanish *Mar. 2022*

Special Black Hole [link] - Couch of Science event (>1100 views between platforms) *Apr. 2020*

Speed dating with a Scientist - Pint of Science Valentine's day event *Feb. 2019*

OTHER CONTRIBUTIONS

ESO Student Selection Committee *2022-2023*

ESO Colloquium Committee *2021-2023*

SOC - Three is not a crowd: Multiple companions as the cause or cure for binary star problems *Aug. 2023*

Referee - I have refereed for: A&A, ApJ, AJ, PASJ, and New Astronomy

CERTIFICATIONS

ESO VLT night astronomer certification - I am certified for night operations at the VLT

ESO VLT instrument certifications - XSHOOTER, SPHERE, CRIRES+, ESPRESSO

Dutch - B1 - certified by the Instituut voor Levende Talen (Leuven, BE)

Spanish - A2 - certified by the Instituto Cervantes de España

PUBLICATION LIST

Sana, H., Tramper, F., **Abdul-Masih, M.**, et al., (2024), *X-Shooting ULLYSES: Massive stars at low metallicity. II. DR1: Advanced optical data products for the Magellanic Clouds*, Astronomy and Astrophysics, 688, A104

Shenar, T., Bodensteiner, J., Sana, H., et al., (2024), *Binarity at LOw Metallicity (BLOeM): I. a spectroscopic VLT monitoring survey of massive stars in the SMC*, arXiv e-prints, arXiv:2407.14593

Hawcroft, C., Mahy, L., Sana, H., et al., (2024), *Empirical mass-loss rates and clumping properties of O-type stars in the LMC*, arXiv e-prints, arXiv:2407.06775

Blomme, R., Rauw, G., Volpi, D., et al., (2024), *The colliding-wind binary HD 168112*, Astronomy and Astrophysics, 687, A106

Hubrig, S., Schöller, M., Järvinen, S. P., et al., (2024), *Detection of extragalactic magnetic massive stars*, Astronomy and Astrophysics, 686, L4

Royer, P., Merle, T., Dsilva, K., et al., (2024), *MELCHIORS. The Mercator Library of High Resolution Stellar Spectroscopy*, Astronomy and Astrophysics, 681, A107

Vink, J. S., Mehner, A., Crowther, P. A., et al., (2023), *X-Shooting ULLYSES: Massive stars at low metallicity. I. Project description*, Astronomy and Astrophysics, 675, A154

Abdul-Masih, M., (2023), *Effects of rotation on the spectroscopic observables of massive stars*, Astronomy and Astrophysics, 669, L11

Rocha, D. F., Almeida, L. A., Damineli, A., et al., (2022), *Distance and age of the massive stellar cluster Westerlund 1 - II. The eclipsing binary W36*, Monthly Notices of the Royal Astronomical Society, 517, 3749

Abdul-Masih, M., Escorza, A., Menon, A., et al., (2022), *Constraining the overcontact phase in massive binary evolution. II. Period stability of known O+O overcontact systems*, Astronomy and Astrophysics, 666, A18

Mahy, L., Sana, H., Shenar, T., et al., (2022), *Identifying quiescent compact objects in massive Galactic single-lined spectroscopic binaries*, Astronomy and Astrophysics, 664, A159

Shenar, T., Sana, H., Mahy, L., et al., (2022), *An X-ray-quiet black hole born with a negligible kick in a massive binary within the Large Magellanic Cloud*, Nature Astronomy, 6, 1085

Brands, S. A., de Koter, A., Bestenlehner, J. M., et al., (2022), *The R136 star cluster dissected with Hubble Space Telescope/STIS. III. The most massive stars and their clumped winds*, Astronomy and Astrophysics, 663, A36

Eisner, N. L., Johnston, C., Toonen, S., et al., (2022), *Planet Hunters TESS IV: a massive, compact hierarchical triple star system TIC 470710327*, Monthly Notices of the Royal Astronomical Society, 511, 4710

Hey, D. R., Kochoska, A., Monier, R., et al., (2022), *Parameters of the eclipsing binary α Draconis observed by TESS and SONG*, Monthly Notices of the Royal Astronomical Society, 511, 2648

Hennicker, L., Kee, N. D., Shenar, T., et al., (2022), *Binary-object spectral-synthesis in 3D (BOSS-3D). Modelling H_α emission in the enigmatic multiple system LB-1*, Astronomy and Astrophysics, 660, A17

Frost, A. J., Bodensteiner, J., Rivinius, T., et al., (2022), *HR 6819 is a binary system with no black hole. Revisiting the source with infrared interferometry and optical integral field spectroscopy*, Astronomy and Astrophysics, 659, L3

Prša, A., Kochoska, A., Conroy, K. E., et al., (2022), *TESS Eclipsing Binary Stars. I. Short-cadence Observations of 4584 Eclipsing Binaries in Sectors 1-26*, The Astrophysical Journal Supplement Series, 258, 16

Menon, A., Langer, N., de Mink, S. E., et al., (2021), *Detailed evolutionary models of massive contact binaries - I. Model grids and synthetic populations for the Magellanic Clouds*, Monthly Notices of the Royal Astronomical Society, 507, 5013

Hawcroft, C., Sana, H., Mahy, L., et al., (2021), *Empirical mass-loss rates and clumping properties of Galactic early-type O supergiants*, Astronomy and Astrophysics, 655, A67

Abdul-Masih, M., Sana, H., Hawcroft, C., et al., (2021), *Constraining the overcontact phase in massive binary evolution. I. Mixing in V382 Cyg, VFTS 352, and OGLE SMC-SC10 108086*, Astronomy and Astrophysics, 651, A96

Johnston, C., Aimar, N., **Abdul-Masih, M.**, et al., (2021), *Characterization of the variability in the O+B eclipsing binary HD 165246*, Monthly Notices of the Royal Astronomical Society, 503, 1124

Sekaran, S., Tkachenko, A., **Abdul-Masih, M.**, et al., (2020), *Tango of celestial dancers: A sample of detached eclipsing binary systems containing g-mode pulsating components. A case study of KIC9850387*, Astronomy and Astrophysics, 643, A162

Conroy, K. E., Kochoska, A., Hey, D., et al., (2020), *Physics of Eclipsing Binaries. V. General Framework for Solving the Inverse Problem*, The Astrophysical Journal Supplement Series, 250, 34

Bodensteiner, J., Shenar, T., Mahy, L., et al., (2020), *Is HR 6819 a triple system containing a black hole?. An alternative explanation*, Astronomy and Astrophysics, 641, A43

Shenar, T., Bodensteiner, J., **Abdul-Masih, M.**, et al., (2020), *The "hidden" companion in LB-1 unveiled by spectral disentangling*, Astronomy and Astrophysics, 639, L6

Abdul-Masih, M., Banyard, G., Bodensteiner, J., et al., (2020), *On the signature of a 70-solar-mass black hole in LB-1*, Nature, 580, E11

Abdul-Masih, M., Sana, H., Conroy, K. E., et al., (2020), *Spectroscopic patch model for massive stars using PHOEBE II and FASTWIND*, Astronomy and Astrophysics, 636, A59

Mahy, L., Sana, H., **Abdul-Masih, M.**, et al., (2020), *The Tarantula Massive Binary Monitoring. III. Atmosphere analysis of double-lined spectroscopic systems*, Astronomy and Astrophysics, 634, A118

Abdul-Masih, M., Sana, H., Sundqvist, J., et al., (2019), *Clues on the Origin and Evolution of Massive Contact Binaries: Atmosphere Analysis of VFTS 352*, The Astrophysical Journal, 880, 115

Escorza, A., Karinkuzhi, D., Jorissen, A., et al., (2019), *Barium and related stars, and their white-dwarf companions. II. Main-sequence and subgiant starss*, Astronomy and Astrophysics, 626, A128

Abdul-Masih, M., Prša, A., Conroy, K., et al., (2016), *Kepler Eclipsing Binary Stars. VIII. Identification of False Positive Eclipsing Binaries and Re-extraction of New Light Curves*, The Astronomical Journal, 151, 101

Kirk, B., Conroy, K., Prša, A., et al., (2016), *Kepler Eclipsing Binary Stars. VII. The Catalog of Eclipsing Binaries Found in the Entire Kepler Data Set*, The Astronomical Journal, 151, 68

Conroy, K. E., Prša, A., Stassun, K. G., et al., (2014), *Kepler Eclipsing Binary Stars. V. Identification of 31 Candidate Eclipsing Binaries in the K2 Engineering Dataset*, Publications of the Astronomical Society of the Pacific, 126, 914