Babar Ali, PhD

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Professional Profile

Experienced astronomer with formal training in Data Science. I have combined expertise in both rigorous scientific analysis, and applied statistics tools for data science.

Tech Stack: Python (+scikit-learn, +pandas, +jython), R, SQL, IDL, Linux/Unix, Git, AWS/S3

Experience

2014 – Present **Research Scientist, Space Sciences Institute**, Boulder, Colorado

- Carry out independent research on the formation and evolution of protostars.

1999 – 2014 **Astronomer, California Institute of Technology**, Pasadena, CA

NASA *Herschel* Science Center (NHSC)

- Help develop data processing algorithms and implement workflows to produce science-ready products from raw telemetry.
- Help calibrate, characterize and mitigate noise, and validate scientific products for *Herschel*'s public archive.
- Carry out original scientific research.
- 50+ publications and technical reports.
- Effectively worked with teams distributed in the US and in Europe.

NASA/IPAC Star & Exoplanet Database

- Organized meta-information and data on dozens of properties of nearby stars and their planets in a set of query-able database tables
- Led the implementation of this design and the first public release of the archive

Teaching, Reporting & Workshop Training

- Designed several detailed step-by-step tutorial series to simplify complex procedures for processing data from *Herschel* and Palomar Observatory
- Led 5-50 person workshops on various aspects of *Herschel* and the Infrared Space Observatory for the professional astronomy community
- Led a group of educators through a 1-year long research project via NITARP, a program to bring science research to high school teachers and museum professionals. http://nitarp.ipac.caltech.edu/

2014 – **Senior Data Scientist, various start-ups**, Silicon beach, Los Angeles, CA
BlackLine, Inc. (current)

- Develop analytical model and machine learning algorithms for automating financial accounting tasks.

Fair Financial
- Develop multi-variable linear regression models for the automotive industry.
- Responsible for analytical framework for pricing vehicles.

Avant Credit, Inc.
- Develop XGBoost classification & regression underwriting models to predict customer default risk on financial products.

MatchCraft, LLC
- Build fully autonomous optimization models for Search Engine Marketing (SEM) campaigns.
- Design and implement before/after experiments to determine effectiveness of SEM campaigns.

1996 – 1999 **Postdoc scholar, University of Rochester, Rochester, NY**
- Responsible for the design, implementation and scientific analysis of large open-time program on brown dwarf stars using the ESA/NASA Infrared Space Observatory (ISO).

Education & Professional Training

Stanford University, Center for Professional Development
Graduate Professional Certificate in Data Mining & Applications, 2015

The Ohio State University
PhD in Astronomy, 1996 *Topic: Infrared spectroscopy of protostars in Orion*

University of Arizona
BSc in Physics, 1990 Minor: German
BSc in Astronomy, 1990

Awards & Professional Service

- 2010, 2011 and 2014 NASA Public Service Group Achievement Award
- Referee for *The Astrophysical Journal*, *IEEE transactions on image processing*, and the *Publication of the Astronomical Society of the Pacific*
- Technical evaluator for NASA/Herschel open-time proposals, and NASA ADP grant proposals.

Major Grants

- 2014 – 2017 NASA/Herschel GT1: Co-investigator Herschel/PACS spectroscopy of YSOs ~$15K
- 2010 – 2017 NASA/Herschel OT1: Co-investigator on 3 programs ~$15K
- 2008 – 2014 NASA/Herschel OT Key Program: Co-investigator The Herschel Orion Protostar Survey ~$40K
- 2004 – 2007 NASA/ADAP Award for NStED Archive ~$900K
- 2001 – 2003 NASA/ADP: Co-investigator "Infrared Astrophysics of YSOs from ISO" ~$300K

Professional Service

- Referee and technical evaluator for *The Astrophysical Journal*, *IEEE transactions on image processing*, the *Publication of the Astronomical Society of the Pacific*
- Technical evaluator for NASA Astrophysics Data Program proposals.
- NASA IPAC Teacher Archive Research Program (NITARP) science mentor for 2013

Selected Publications in Refereed Journals

"*The Herschel Orion Protostar Survey: Imaging and Photometry Results* "
Ali, Babar, Megeath, S. T., Fischer, W. J., and the HOPS team.
2018, ApJ, submitted

"*The Herschel Orion Protostar Survey: Luminosity and Envelope Evolution*"
Fischer, W. J., Megeath, S. T., Furlan, E., **Ali, Babar** and 11 additional authors.
2017, ApJ, 840, 69

"*The Herschel Orion Protostar Survey: Spectral Energy Distributions and Fits Using a Grid of Protostellar Models*"
Furlan, E., Fischer, W. J., **Ali, Babar** and 12 additional authors.
2016, ApJSS, 224, 1

"*A Herschel and APEX Census of the Reddest Sources in Orion: Searching for the Youngest Protostars*"
Stutz, A. M. et al. (8th author)
2013, ApJ, 767, 36

"*Herschel/PACS Spectroscopic Survey of Protostars in Orion: The Origin of Far- infrared CO Emissiton*"
Manoj, P. et al. (12th author)
2013, ApJ, 763, 83

"*First Science Observations with SOFIA/FORCAST: Properties of Intermediate- luminosity Protostars and Circumstellar Disks in OMC-2*"
Adams, J. D. et al. (7th author)
2012, ApJ, 749, 24

"*Predicted Colors and Flux Densities of Protostars in the Herschel PACS and SPIRE filters*"
Babar Ali, J. Tobin, W. Fischer, C. Poteet, T. Megeath, L. Allen, L. Hartmann, N. Calvet, E. Furlan & M. Osorio
2010 A&AL, 518, 122

"*Hier ist wahrhaftig ein Loch im Himmel – The NGC 1999 dark globule is not a globule*"
T. Stanke, A. Stutz, J. Tobin, **B. Ali**, T. Megeath + 20 Co-authors
2010 A&AL, 518, 94

"*Herschel/PACS Imaging of Protostars in the HH 1-2 Outflow complex*"
W. Fischer, T. Megeath, **Babar Ali**, + 21 Co-authors.
2010 A&AL, 518, 122

I am co-author on 4 additional papers in the A&A letters special Herschel edition.

"*A mid-IR survey of the L 1641-N region with ISOCAM*"
Babar Ali & Alberto Noriega-Crespo
2004 ApJ, 613, 374

"Cool Companions to Hot White Dwarfs"
Paul J. Green, **Babar Ali**, & R. Napiwotzki
2000, ApJ, 540, 992

"*Medium Resolution Near Infrared (2.15 μm – 2.35 μm) Spectroscopy of Late- type main Sequence stars*"
Babar Ali, John S. Carr, D. L. DePoy, Jay A. Frogel, & K. Sellgren
1995, AJ, 110, 2415

"*A 2.2 mm Imaging Survey of the Orion A Molecular Cloud*"
Babar Ali & D. L. DePoy
1995, AJ, 109, 709

Selected Technical Publications

"ISAP: ISO Spectral Analysis Package"
Ali, B. + 21 co-authors
Astrophysics Source Code Library, record ascl:1403.009

"The effect of the high-pass filter data reduction technique on the Herschel PACS Photometer PSF and noise"
Popessso, P. et al. (12th author).
2012, arXiv:1211.4257

"Data reduction pipeline for the Hi-GAL survey"
Traficante, A., Calzoletti, L., Veneziani, M, **Ali, B.** + 12 Co-authors.
2011, MNRAS, 416, 2932

"The photodetector Array Camera and Spectrometer (PACS) on the Herschel Space Observatory"
Poglitsch, A. et al. (14th author)
2010, A&AL, 518, 2

"The Herschel/PACS photometer pipeline"
Wieprecht, et al. (8th author)
2011, ADASS XVIII, ASP Conference Series, 411, 531

"The NStED Stellar and Exoplanet Hosting Star Service"
Ramirez, S., **Ali, B.** + 15 co-authors.
2009, in *Transiting Planets*, IAU Symposium, 253, 474

"The ISO Visualizer – A new way to look at ISO data"
Babar Ali, Mihseh Kong, & Alberto Salama
2003 in ESA SP-511 "Exploiting the ISO Data Archive"

"Correcting the ISOCAM field-of-view Distortion"
Babar Ali, Stephan Ott, R. Gastaud, K. Okumura & Th. Diovu
2001 in ESA SP-481 "*The calibration legacy of the ISO Mission*"

"The ISOCAM Interactive Analysis System (CIA): A Review of 7 years of Development"
R. Gastaud et al. (7th author)
2001 in ESA SP-481 "*The calibration legacy of the ISO Mission*"

"Nova Herculis"
R. Wagner, R. Bertram, **Babar Ali**, & S. Starrfield 1991 IAU Circular 5227