

Rubab Khan

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Research

My primary research focus is massive star geriatrics: the study of the affects of old age on the most massive stars. I am particularly interested in understanding how episodic mass-loss in the last stages of stellar evolution influences the fate of the stars, circumstellar dust formation and chemical enrichment of galaxies. I specialize in crowded-field photometry and multi-wavelength astrometry of Hubble / Spitzer / Herschel space-telescope data. I have co-authored 35 papers, including 9 as the first-author and 2 as the second-author.

Education

Ph.D. Astronomy, The Ohio State University, Thesis: “Massive Star Geriatrics” 2014
M.S. Astronomy, The Ohio State University 2010
A.B. Astrophysics, Columbia University 2008

Experience

JWST Fellow, NASA GSFC, Observational Cosmology Lab. 2014 – present
Research/Teaching Assistant, OSU Dept. of Astronomy 2008 – 2014
Research Laboratory Assistant, Columbia Experimental Gravity 2004 – 2008

Refereed Publications

1. **Khan, Rubab**, Adams, S. M., Stanek, K. Z., Kochanek, C. S., Sonneborn, G. 2015, “Discovery of Five Candidate Analogs for η Carinae in Nearby Galaxies”, ApJ Letters, 815, L18
2. **Khan, Rubab**; Stanek, K. Z.; Kochanek, C. S.; Sonneborn, G. 2015, “*Spitzer* Point Source Catalogs of $\sim 300,000$ Stars in Seven Nearby Galaxies”, ApJ Supplement, 219, 42
3. **Khan, Rubab**; Kochanek, C. S.; Stanek, K. Z.; Gerke, J. 2015, “Finding η Car Analogs in Nearby Galaxies Using Spitzer: II. Identification of An Emerging Class of Extragalactic Self-Obscured Stars”, ApJ, 799, 187
4. **Khan, Rubab**; Stanek, K. Z.; Kochanek, C. S. 2013, “Finding η Car Analogs in Nearby Galaxies Using Spitzer: I. Candidate Selection”, ApJ, 767, 52

5. Murphy, David et al. *incl.* **Khan, Rubab** 2013, “Detecting Long-duration Narrow-band Gravitational Wave Transients Associated with Soft Gamma Repeater Quasiperiodic Oscillations”, *Phys. Rev. D*, 87, 103008
6. Kochanek, C.S., **Khan, Rubab**, Dai, X. 2012, “On Absorption by Circumstellar Dust, With the Progenitor of SN 2012aw as a Case Study”, *ApJ*, 759, 20
7. Assef, R. J. et al. *incl.* **Khan, Rubab** 2011, “Black Hole Mass Estimates Based on C IV are Consistent with Those Based on the Balmer Lines”, *ApJ*, 742, 93
8. **Khan, Rubab**; Stanek, K. Z.; Stoll, R.; Prieto, J. L. 2011, “Super-Chandrasekhar SNe Ia Strongly Prefer Metal-Poor Environments”, *ApJ Letters*, 737, L24
9. **Khan, Rubab**; Stanek, K. Z.; Kochanek, C. S.; Bonanos, A. Z. 2011, “Object-X: The Brightest Mid-IR Point Source in M33”, *ApJ*, 732, 43
10. Abadie, J. et al. *incl.* **Khan, Rubab** 2011, “Search for Gravitational Waves Associated with the August 2006 Timing Glitch of the Vela Pulsar”, *Phys. Rev. D*, 83, 069902
11. **Khan, Rubab** et al. 2011, “Pre-discovery and Follow-up Observations of the Nearby SN 2009nr: Implications for Prompt Type Ia Supernovae”, *ApJ*, 726(2), 106
12. Humphreys, Roberta M. et al. *incl.* **Khan, Rubab** 2010, “SN 2010U: A LUMINOUS NOVA IN NGC 4214”, *ApJ*, 718, 43
13. Abadie, J. et al. *incl.* **Khan, Rubab** 2010, “Search for Gravitational-wave Inspiral Signals Associated with Short Gamma-ray Bursts During LIGO’s Fifth and Virgo’s First Science Run”, *ApJ*, 715, 1453
14. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2010, “Search For Gravitational-wave Bursts Associated with Gamma-ray Bursts using Data from LIGO Science Run 5 and Virgo Science Run 1”, *ApJ*, 715, 1438
15. **Khan, Rubab** et al. 2010, “Census of Self-Obscured Massive Stars in Nearby Galaxies with Spitzer: Implications for Understanding the Progenitors of SN 2008S-Like Transients”, *ApJ*, 715, 1094
16. Abadie, J. et al. *incl.* **Khan, Rubab** 2010, “All-sky Search for Gravitational-wave Bursts in the First Joint LIGO-GEO-Virgo Run”, *Phys. Rev. D*, 81, 102001
17. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2010, “Searches for Gravitational Waves from Known Pulsars with Science Run 5 LIGO Data”, *ApJ*, 713, 671
18. **Khan, Rubab** and Chatterji, S., 2009, “Enhancing the Capabilities of LIGO Time-Frequency Plane Searches Through Clustering”, *Classical & Quantum Gravity*, 26, 155009
19. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2009, “Stacked Search for Gravitational Waves from the 2006 SGR 1900+14 Storm”, *ApJ Letters*, 701, 68

20. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2009, “Search for high frequency gravitational-wave bursts in the first calendar year of LIGO’s fifth science run”, *Phys. Rev. D*, 80, 102002
21. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2009, “Search for gravitational-wave bursts in the first year of the fifth LIGO science run”, *Phys. Rev. D*, 80, 102001
22. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2009, “First LIGO search for gravitational wave bursts from cosmic (super)strings”, *Phys. Rev. D*, 80, 062002
23. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2009, “Search for gravitational wave ringdowns from perturbed black holes in LIGO S4 data”, *Phys. Rev. D*, 80, 062001
24. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2009, “An Upper Limit on the Stochastic Gravitational-Wave Background of Cosmological Origin”, *Nature*, 460, 990
25. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2009, “Search for Gravitational-Waves from Low Mass Compact Binary Coalescence in 186 Days of LIGO’s Fifth Science Run”, *Phys. Rev. D*, 80, 047101
26. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2009, “Einstein@Home Search for Periodic Gravitational-Waves in Early S5 LIGO Data”, *Phys. Rev. D*, 80, 042003
27. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2009, “Observation of A Kilogram-scale Oscillator Near its Quantum Ground State”, *New Journal of Physics*, 11, 073032
28. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2009, “Search for Gravitational Waves from Low Mass Binary Coalescences in the First Year of LIGO’s S5 Data”, *Phys. Rev. D*, 79, 122001
29. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2009, “All-Sky LIGO Search for Periodic Gravitational Waves in the Early Fifth-Science-Run Data”, *Phys. Rev. Letters*, 102, 111102
30. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2009, “Einstein@Home Search for Periodic Gravitational-Waves in LIGO S4 Data”, *Phys. Rev. D*, 79, 022001
31. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2008, “First Joint Search for Gravitational-Wave Bursts in LIGO and GEO 600 Data”, *Class. & Quant. Gravity*, 25, 245008
32. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2008, “Search for Gravitational-Wave Bursts from Soft Gamma Repeaters”, *Phys. Rev. Letters*, 101, 211102
33. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2009, “Beating the Spin-Down Limit on Gravitational-Wave Emission from the Crab Pulsar”, *ApJ Letters*, 683, 45
34. Abbott, B. P. et al. *incl.* **Khan, Rubab** 2008, “Astrophysically Triggered Searches for Gravitational-Waves: Status and Prospects”, *Class. & Quant. Gravity*, 25, 114051

35. Kalmus, P., **Khan, Rubab**, Matone, L, Marka. S. 2007, “Search Method for Unmod-
eled Transient Gravitational-Waves Associated with SGR Flares”, *Class. & Quant. Grav.*,
24, 659

Non-Refereed Publications

1. Jencson, J. E. et al. *incl.* **Khan, Rubab**. 2016, “SPIRITS Discoveries of In-
frared Transients and Variables with Spitzer Early Release Data”, *The Astronomer’s*
Telegram, 8688, 1
2. **Khan, Rubab** 2015, “The Most Massive Extragalactic Evolved Stars”, *The Space*
Telescope Science Institute Newsletter, 32, 2
3. Jencson, J. E. et al. *incl.* **Khan, Rubab**. 2015, “SPIRITS Discoveries of Recent
Infrared Transients with Spitzer Early Release Data”, *The Astronomer’s Telegram*,
7929, 1
4. **Khan, Rubab** 2013, “Possible Spitzer Counterpart of PSN J01364816+1545310”,
The Astronomer’s Telegram, 5230, 1
5. Szczygiel, D.; **Khan, Rubab**; Kochanek, C. S. 2011, “Further Properties of the
Candidate Progenitor of SN 2011dh in M51”, *The Astronomer’s Telegram*, 3431, 1
6. Prieto, J. L.; **Khan, Rubab**; Hornochova, P. 2010, “M31N 2010-01a and M31N
2010-12c”, *Central Bureau Electronic Telegrams*, 2610, 2
7. Prieto, J. L.; **Khan, Rubab**; Garnavich, P.; Pagnini, J.; Yusa, T. 2010, “Apparent
Nova in M31”, *Central Bureau Electronic Telegrams*, 2594, 1
8. Hornocho, K.; **Khan, Rubab** et al. 2010, “Nova in M31: M31N 2010-05a”, *Central*
Bureau Electronic Telegrams, 2319, 1
9. Prieto, J. L. et al. *incl.* **Khan, Rubab**. 2010, “Optical and Near-IR Follow-up of
SN 2010da: Evidence for Warm Dust”, *The Astronomer’s Telegram*, 2660, 1
10. **Khan, Rubab**; Stanek, K. Z.; Kochanek, C. S.; Thompson, T. A.; Prieto, J. L. 2010,
“Mid-IR progenitor of SN 2010da in NGC 300”, *The Astronomer’s Telegram*, 2632,
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11. Hornocho, K. et al. *incl.* **Khan, Rubab**. 2010, “Apparent Nova in M81: M81N
2010-01c”, *Central Bureau Electronic Telegrams*, 2180, 1
12. Hornocho, K. et al. *incl.* **Khan, Rubab**. 2010, “Apparent Novae in M81: M81N
2010-01a and M81N 2010-01b”, *Central Bureau Electronic Telegrams*, 2170, 1
13. Hornocho, K.; Prieto, J.; **Khan, Rubab**; Pejcha, O. 2010, “M31N 2010-01a”, *Central*
Bureau Electronic Telegrams, 2136, 1
14. Hornocho, K.; Prieto, J.; **Khan, Rubab**; Pejcha, O.; Green, D. W. E. 2010, “Novae
in M81”, *Central Bureau Electronic Telegrams*, 2132, 1

15. Prieto, J. L.; **Khan, Rubab** et al. 2010, “Supernovae 2009ns-2009nx and 2010I-2010M”, Central Bureau Electronic Telegrams, 2131, 1
16. Hornoch, K.; Prieto, J.; **Khan, Rubab** et al. 2010, “M31N 2010-01a”, Central Bureau Electronic Telegrams, 2127, 1
17. Prieto, J. L. and **Khan, Rubab**. 2010, “Supernovae 2010C and 2010D”, Central Bureau Electronic Telegrams, 2122, 1
18. **Khan, Rubab** and Prieto, J. 2010, “Supernovae 2009mx and 2009my”, Central Bureau Electronic Telegrams, 2120, 1
19. Prieto, J. L. and **Khan, Rubab**. 2010, “Supernova 2010B in NGC 5370”, Central Bureau Electronic Telegrams, 2118, 1
20. Prieto, J. L. and **Khan, Rubab** et al. 2010, “MDM classification of CRTS supernova discoveries”, The Astronomer’s Telegram, 2388, 1

Conference Presentations / Abstracts

1. **Khan, Rubab** 2016, “Discovery of Five Candidates for Present Day η Carinae Analogs in Nearby Galaxies”, American Astronomical Society Meeting Abstracts, 227, #227.07
2. **Khan, Rubab** 2015, “The Most Massive Extragalactic Evolved Stars”, Exploring the Universe with JWST, Noordwijk, Netherlands
3. **Khan, Rubab** 2015, “An Emerging Class of Extragalactic Self-Obscured Stars”, American Astronomical Society Meeting Abstracts, 225, #223.05
4. **Khan, Rubab** 2015, “Massive Star Geriatrics”, Spitzer InfraRed Intensive Transients Survey meeting, Pasadena, CA
5. **Khan, Rubab** 2014, “An Emerging Class of Extragalactic Self-Obscured Stars”, Wide-field InfraRed Surveys: Science and Techniques, Pasadena, CA
6. **Khan, Rubab** 2014, “Does Episodic Mass Loss Dominate the Evolution of Massive Stars?”, American Astronomical Society Meeting Abstracts, 223, #154.22
7. **Khan, Rubab**; Stanek, K. Z.; Kochanek, C. S. 2013, “Searching for Analogs of η Carinae in Nearby Galaxies Using Spitzer”, AAS Meeting Abstracts, 221, #213.07
8. **Khan, Rubab**; Stanek, K. Z.; Kochanek, C. S. 2012, “In Search of ... η Car”, Workshop on Outstanding Problems in Massive Star Research – the final stages, St. Paul, MN
9. **Khan, Rubab**; Stanek, K. Z.; Kochanek, C. S. 2012, “Self-Obscured Dusty Massive Stars in Nearby Galaxies”, American Astronomical Society Meeting Abstracts, 219, #224.05

10. **Khan, Rubab** et al. 2011, “Self-Obscured Dusty Massive Stars in Nearby Galaxies”, Meeting on Four Decades of Research in Massive Stars, Montreal, QC, Canada
11. **Khan, Rubab** 2008, “Searching for gravitational wave fingerprints of SGR QPOs”, American Physical Society April Meeting Abstracts, 1029, #S1.029; LIGO-G080188
12. Kalmus, P.; Jones, G.; **Khan, Rubab** et al. 2007, “Complementing Inspiral Searches with Burst Pipelines”, Gravitational-Wave Data Analysis Workshop 12, Cambridge, MA; LIGO-G070860
13. **Khan, Rubab**; Matone. L.; Marka, S.; Sigg, D. 2007, “Recent Timing Diagnostic Results”, LIGO/Virgo Collaborations Meeting, Cambridge, MA; LIGO-G070551
14. Kalmus, P.; **Khan, Rubab**; Marka, S.; Matone. L. 2006, “Search Method for Gravitational Wave Transients Associated with the SGR 1806-20 Giant Flare”, Gravitational-Wave Data Analysis Workshop 11, Potsdam, Germany; LIGO-G060636
15. **Khan, Rubab** and Chatterji, S. 2006, “Enhancing the Capabilities of LIGO Time-Frequency Plane Searches Through Clustering”, Gravitational-Wave Data Analysis Workshop 11, Potsdam, Germany; LIGO-G060607

Selected Media Coverage

- “Mega-Star Eta Carinae Isn’t a Cosmic Loner”, Discovery News
- “Spotting “Twins” of Superstar Eta Carinae”, Sky & Telescope
- “New Giant Stars Found Outside Our Galaxy”, Inside Science
- “5 supersize stars found in other galaxies, comparable to our stellar heavyweight Eta Carinae”, US News & World Report
- “Space telescopes see “twins” of superstar Eta Carinae in other galaxies”, The Astronomy Magazine
- “First “Twins” of Mysterious Erupting Star Found”, Space.com
- “Rare super stars spotted in distant galaxies”, Daily Mail

Professional References

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