

CURRICULUM VITAE – Dr. Todd R. Hunter

CONTACT:

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EDUCATION:

- California Institute of Technology, **Ph.D.** Astronomy, 1996; **M.S.** Astronomy, 1993.
- Dissertation: “A Submillimeter Imaging Survey of Ultracompact HII Regions”, Advisor: Tom Phillips
- Pennsylvania State University, **B.S.** Astronomy & Astrophysics, 1991, Advisor: Lawrence Ramsey

EMPLOYMENT HISTORY:

- 01/2011–present Scientist at National Radio Astronomy Observatory (continuing appointment)
North American ALMA Science Center / Telescope Support Group
- 11/2006–01/2011 Associate Scientist, NRAO; NA ALMA Front End Project Scientist
Instrumentation Scientist for the Green Bank Telescope (GBT) PTCS Project
- 03/1999–10/2006 Astrophysicist, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA
Engineering Test Program Leader for Submillimeter Array (SMA) (2004-2006)
- 10/1996–03/1999 Postdoctoral Fellow, Submillimeter Array & Submillimeter Receiver lab
Harvard-Smithsonian Center for Astrophysics, Cambridge, MA
- 09/1991–10/1996 Graduate Research Assistant, Astronomy Department, Submillimeter group
California Institute of Technology, Pasadena, CA
- 05/1991–08/1991 Summer Research Student, Global Oscillation Network Group (GONG) Project
National Solar Observatory, NOAO, Tucson, AZ; Mentor: Dr. Jack Harvey
- 05/1990–08/1990 Summer Research Student (NSF/REU program), Very Large Array, National
Radio Astronomy Observatory, Socorro; NM, Mentor: Dr. R. Craig Walker

OUTSIDE APPOINTMENTS:

- 06/2016–07/2016 Scottish Universities Physics Alliance Distinguished Visitor (Univ. of St. Andrews)
- 02/2014–present Research Associate at Smithsonian Astrophysical Observatory (SAO)

KEY TECHNICAL ACCOMPLISHMENTS

- Served as calibration and imaging expert during ALMA Long Baseline Campaigns (2014-15)
 - Led the scientific heuristics development for the ALMA pipeline (2013–present)
 - Wrote python CASA tasks to facilitate calibration and QA of ALMA science data (2011–present)
 - Improved the GBT surface accuracy from 390 to 240 microns rms (2009)
 - Designed and developed the GBT AutoOOF holography observer tool (2008)
 - Commissioned the NA ALMA Front-End beam pattern analysis software (2008-2010)
 - Obtained the first ALMA interferometric spectrum at the ATF in New Mexico (January 2008)
 - Organized and tested the upgrade of the GBT pointing model (2007)
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- Led the SMA science and engineering testing team (2004-2006)
 - Led the SMA 690 GHz astronomical imaging and phase transfer testing campaign (2005-2006)
 - Designed & wrote the SMA Receiver, LO & Antenna servo firmware & software (1996-2006)
 - Designed and wrote the SMA Optical CCD guidescope Linux device driver (2001-2006)
 - Contributed large portions of the SMA “real-time monitor & control” software (1997-2006)
 - Developed SIS receiver and HEMT total power stabilization algorithms for SMA (2001-2006)
 - Devised tuning software and field-tested an optically-generated submillimeter LO (2001-2006)
 - Designed the Submillimeter High-Angular Resolution Camera (SHARC I) optics (1993-1994)
 - Designed and programmed the real-time control software for SHARC I (1994-1996)

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pre-NRAO

ASTRONOMY RESEARCH ACTIVITIES:

- Imaging massive protoclusters and hot cores: CSO, BIMA, OVRO, SMA, VLA, ALMA (1995-present)
- Search for high-mass protostellar disks: VLA, OVRO, GBT, SMA, ALMA (1998-present)
- Imaging protostellar outflows, masers and jets: OVRO, CSO, 12m, VLA, SMA, ALMA (1993-present)
- Imaging ultracompact HII regions at submm wavelengths: CSO, SMA, ALMA (1994-present)
- High-resolution imaging of water masers in evolved stars: SMA, ALMA (2005-2014)
- Search for high-redshift CII fine-structure line emission: CSO, SMA (1998-2005)
- Search for intermediate and high-redshift CO line emission: GBT, SMA (2004-2006)
- Interstellar medium studies of nearby galaxies: CSO, HHT (1999-2001)

ACADEMIC SERVICE

- Referee for ApJ, ApJL, A&A, PASA, PASJ, New Astronomy, Cambridge Univ. Press (1997-present)
- NRAO Scientist & Engineer Performance Review Committee (2011-2016)
- ALMA Early Science Cycle 0 Proposal Technical Assessment Panel
- LOC and SOC for March 2011 ALMA Development Workshop in Charlottesville
- LOC for Sept. 2008 NAASC workshop: “The Birth and Feedback of Massive Stars”
- LOC for June 2007 NAASC workshop: “Through Disks to Stars and Planets”
- Organizer of Workshop on Out-of-focus Holography at Green Bank (2007)
- External Referee for NRAO Green Bank Telescope Time Allocation Committee (2005-2006)
- NSF ATI Radio Panel Proposal Review Committee (2006)
- NASA APRA Proposal Review Committee (2004)
- SMA Time Allocation Committee and Postdoc Selection committee (2002-2006)
- Co-organizer of the CfA Radio & Geoastronomy Division Lunch Talk Series (2003-2005)
- Harvard University Clay and Menzel Fellowship Selection Committee (2001-2003)

PROFESSIONAL SERVICE

- ALMA Pipeline Working Group (2013-present)
- ALMA Observing Modes Working Group (2011-present)
- ALMA EU FEIC Operational Readiness Review Panel (October 2009)
- ALMA NA FEIC Operational Readiness Review Panel (July 2009)
- GBT Antenna Servo Replacement Design Review (May 2009)
- ALMA Band 3 Manufacturing Readiness Review Panel (February 2009)
- ALMA Band 6 Manufacturing Readiness Review Panel (September 2008)
- ALMA FE LO Manufacturing Readiness Review Panel (May 2008)
- ALMA FE LO Critical Design Review Panel (May 2006)

PROFESSIONAL AFFILIATIONS:

- American Astronomical Society (AAS)
- International Astronomical Union (IAU)
- U.S. National Committee of International Union of Radio Scientists (USNC-URSI)

HONORS AND AWARDS:

- Distinguished Performance Award, NRAO, 2016
- Best poster (instrumentation category) at Revolution in Astronomy with ALMA, Tokyo, Dec. 2014
- Smithsonian Institution Certificates of Award: July 30, 2000 and July 28, 2002
- Braddock Scholarship at Penn State University Eberly College of Science (1987-1991)

GRANTS AND CONTRACTS:

- PI of ALMA Development Study “Improving the calibration of atmospheric spectral features in ALMA data” (FY2016)
- Co-I on “Terahertz frequency HEB receiver for the observation of NH⁺”, granted by NASA/JPL for a Director’s Research and Development Fund Proposal (FY2004-06)
- Participant in “Exploration of terahertz emission from astronomical sources”, Harvard-Smithsonian Center for Astrophysics Internal Research & Development grant program (FY2004)

TEACHING AND ADVISING EXPERIENCE:

- Advisor and PhD committee member to Univ. of Virginia graduate student Paul Ries (2007-2012)
- PhD committee member for Univ. of Virginia graduate student Chaitale Parashare (2009-2011)
- Laboratory mentor to Harvard graduate students Dan Marrone and James Battat (2002-2006)
- Scientific mentor and PhD committee member for Peter Sollins (2004-2005)
- Predoctoral Research Review Committee chair for CfA pre-doc student Yang Wang (2004-2005)
- Scientific mentor for CfA Summer Intern Student Mark Kramer (2000)
- T.A. for 3 undergraduate astronomy courses at Caltech (1992-1993)

Recent Refereed Publications (2014–present)

14. “VLA survey of dense gas in extended green objects: prevalence of 25 GHz methanol masers”, Towner, A.P.M., et al., ApJS, in press, arXiv: 1705.06825
13. “An extraordinary outburst in the massive protostellar system NGC6334I-MM1: quadrupling of the millimeter continuum”, **Hunter, T. R.**, et al., ApJL, 837, L29, arXiv: 1701.08637
12. “Simultaneous low- and high-mass star formation in a massive protocluster: ALMA observations of G11.92-0.61”, Cyganowski, C. J., et al., MNRAS, in press, arXiv: 1701.02802
11. “The Massive Protostellar Cluster NGC6334I at 200 AU Resolution: Further Multiplicity, Diversity and a Hot Multi-Core”, Brogan, C.L., **Hunter, T.R.**, et al. 2016, ApJ, 832, 187, arXiv: 1609.07470
10. “Self-gravitating disc candidates around massive young stars”, Forgan, D., et al. 2016, MNRAS, 463, 957, arXiv: 1608.05539
9. “G11.92-0.61 MM1: A Keplerian disc around a massive young proto-O star”, Ilee, J.D., et al. 2016, MNRAS, 462, 4386, arXiv: 1608.05561
8. “ALMA maps the Star-Forming Regions in a Dense Gas Disk at $z\sim 3$ ”, Swinbank, M., et al. 2015, ApJL, 806, 17, arXiv: 1505.05148
7. “Revealing the complex nature of the strong gravitationally lensed system H-ATLAS J090311.6+003906 using ALMA”, Dye, S., et al. 2015, MNRAS, 452, 2258, arXiv: 1503.08720
6. “ALMA Long Baseline Observations of the Strongly Lensed Submillimeter Galaxy HATLAS J090311.6+003906 at $z=3.042$ ”, ALMA Partnership, Vlahakis, C., **Hunter, T.R.** et al. 2015, ApJL, 808, L4, arXiv: 1503.02652
5. “ALMA Observations of Asteroid 3 Juno at 60 Kilometer Resolution”, ALMA Partnership, **Hunter, T.R.** et al. 2015, ApJL, 808, L2, arXiv: 1503.02650
4. “First Results from High Angular Resolution ALMA Observations Toward the HL Tau Region”, ALMA Partnership, Brogan, C.L., Pérez, L., **Hunter, T.R.** et al. 2015, ApJL, 808, L3, arXiv: 1503.02649
3. “ALMA sub-mm maser and dust distribution of VY Canis Majoris”, Richards, A. M. S., et al. 2014, A&AL, 572, L9, arXiv: 1409.5497
2. “G11.92-0.61-MM2: A Bonafide Massive Prestellar Core?”, Cyganowski, C. J., Brogan, C. L., **Hunter, T.R.**, et al. 2014, ApJL, 796, 2, arXiv 1410.2605
1. “Subarcsecond Imaging of the NGC6334 I(N) Protocluster: Two Dozen Compact Sources and a Massive Disk Candidate”, **Hunter, T.R.**, et al. 2014, ApJ, 788, 187, arXiv 1405.0496

Selected Refereed Publications (1992-2013, abridged, 60 not shown)

20. “*The Digital Motion Control System for the Submillimeter Array Antennas*”, **Hunter, T.R.**; Wilson, R.W.; Kimberk, R., et al., 2013, JAI, 2, 1350002, arXiv 1303.4397
19. “*A Multi-baseline 12 GHz Atmospheric Phase Interferometer with One Micron Path Length Sensitivity*”, Kimberk, R.S., **Hunter, T.R.**, et al. 2012, JAI, 1, 1350002, arXiv 1206.0039
18. “*Holographic Measurement and Improvement of the Green Bank Telescope Surface Accuracy*”, **Hunter, T. R.**, Schwab, F. R., White, S.D., Ford, J. M., et al., 2011, PASP, 123, 1087
17. “*Measuring and Correcting Wind-Induced Pointing Errors of the Green Bank Telescope Using an Optical Quadrant Detector*”, Ries, P. A., **Hunter, T. R.**, et al., 2011, PASP, 123, 682
16. “*Digging Into NGC6334I(N): Multiwavelength Imaging of a Massive Protostellar Cluster*”, Brogan, C. L., **Hunter, T. R.**, Cyganowski, C. J., et al., 2009, ApJ, 707, 1
15. “*The Green Bank Telescope*”, Prestage, R.M., Constantikes, K.T., **Hunter, T.R.**, King, L.J., Lacasse, R.J., Lockman, F.J., Norrod, R.D., 2009, Proceedings of the IEEE, 97, 1382
14. “*Subarcsecond Submillimeter Imaging of the Ultracompact HII Region G5.89-0.39*”, **Hunter, T. R.**, Brogan, C.L., Indebetouw, R., Cyganowski, C.J., 2008, ApJ, 680, 1271
13. “*Millimeter Multiplicity in NGC 6334 I and I(N)*”, **Hunter, T. R.**, Brogan, C. L., Megeath, S. T., Menten, K. M., Beuther, H., Thorwirth, S., 2006, ApJ, 649, 888
12. “*IRAS 18317–0757: A Cluster of Massive Stars and Protostars*”, **T.R. Hunter**, Q. Zhang, T.K. Sridharan, 2004, ApJ, 606, 929, arXiv: 0704.1301
11. “*A Disk/Jet System toward the High-Mass Young Star in AFGL 5142*”, Qizhou Zhang, **Todd R. Hunter**, T. K. Sridharan & Paul T. P. Ho, 2002, ApJ, 566, 982.
10. “*Search for CO Outflows Toward a Sample of 69 High-Mass Protostellar Candidates: Frequency of Occurrence*”, Q. Zhang, **T.R. Hunter**, J. Brand, T.K. Sridharan, S. Molinari, et al., 2001, ApJL, 552, L167.
9. “*350 μ m Images of Massive Star Formation Regions*”, **T. R. Hunter**, E. Churchwell, C. Watson, P. Cox, D.J. Benford & P. Roelfsema, 2000, AJ, 119, 2711.
8. “*Molecular Jets and H₂O Masers in the AFGL 5142 Hot core*”, **T.R. Hunter**, et al., 1999, AJ, 118, 477.
7. “*G34.24+0.13MM: a deeply embedded proto-B-star*”, **T.R. Hunter**, G. Neugebauer, D.J. Benford, K. Matthews, D.C. Lis, E. Serabyn & T.G. Phillips, 1998, ApJL, 493, L97
6. “*Active Star Formation toward the UCHII Regions G45.12+0.13 and G45.07+0.13*”, **T.R. Hunter**, T.G. Phillips & K.M. Menten, 1997, ApJ, 478, 283
5. “*Optical Design of the Submillimeter High Angular Resolution Camera (SHARC)*”, **T.R. Hunter**, D.J. Benford & E. Serabyn, 1996, PASP, 108, 1042
4. “*A Multiwavelength Picture of the AFGL 5142 Star-forming Region*”, **T.R. Hunter**, L. Testi, G.B. Taylor, G. Tofani, M. Felli & T.G. Phillips, 1995, A&A, 302, 249, arXiv: astro-ph/9503117
3. “*Exploring the Engines of Molecular Outflows: Radio continuum and H₂O Maser Observations*”, G. Tofani, M. Felli, G.B. Taylor & **T.R. Hunter**, 1995, A&AS, 112, 299
2. “*Water Masers Embedded in Ultracompact HII Regions: The W75N Cloud Core*”, **T.R. Hunter**, G.B. Taylor, M. Felli & G. Tofani, 1994, A&A, 284, 215
1. “*Scrambling Properties of Optical Fibers and the Performance of a Double Scrambler*”, **T.R. Hunter** & L.W. Ramsey, 1992, PASP, 104, 1244