Curriculum Vitae: Kayhan Gültekin

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Education

August 2006	PhD, Astronomy	University of Maryland, College Park, MD, USA Thesis: "Growing IMBHs with Gravitational Waves" Adviser: M. Coleman Miller
December 2001	MS, Astronomy	University of Maryland, College Park, MD, USA
May 1999	BA, Physics . . . . *with distinction*	University of Pennsylvania, Philadelphia, PA, USA Thesis: "A Circumstellar Disk Around the High-Mass Protostar L1206A" Adviser: David W. Koerner

Research Appointments

Assistant Research Scientist, *Dept. of Astronomy, U. Michigan* **2009 – present**

Conducted independent research program including the securing of outside funds, the advising of students, and contributing to department and faculty efforts.

Postdoctoral Fellow, *Dept. of Astronomy, U. Michigan* **2006 – 2009**

Analyzed archival *Chandra* data and combined with archival radio data to examine fundamental plane of accretion onto black holes with dynamical masses. Performed numerical simulations of interacting black holes in merging galaxies. Modeled mass distribution and stellar kinematics of galactic nuclei to compare with *HST* and ground-based data to determine masses of supermassive black holes in galactic centers as part of the international "Nuker" collaboration.

Research Assistant, *Center for Theory and Computation, U. Maryland* **2001 – 2006**

Investigated interactions of black hole dynamics in cluster cores, developed and adapted code to perform numerical simulations of sequences of three-body encounters, and used the data from these simulations to test intermediate-mass black hole formation models and to predict likely gravitational wave signatures. Also served as co-administrator of the department's secondary beowulf cluster. Installed and maintained Condor job management software on department computers to utilize unused computing power of over thirty desktop workstations to create a combined 21 GFlop cluster, created tutorial for use of cluster, and assisted faculty and students in use of cluster.

Research Assistant, *Laboratory for Millimeter-Wave Astronomy, U. Maryland* **2000**

Assisted in design of water vapor radiometers planned for use with BIMA millimeter-wave radio interferometer antennae (now part of CARMA), analyzed data from prototype radiometers to evaluate efficacy, and assisted in installation of prototype radiometers on antennae.

Refereed Publications

1. **K. Gültekin** et al. Is There a Black Hole in NGC 4382? *Astrophys. J.*, in press, arXiv:1108.1808.
2. J. R. Jardel et al. Orbit-based Dynamical Models of the Sombrero Galaxy (NGC 4594) *Astrophys. J.*, **739**, 21 (2011). /
3. J. M. Miller & **K. Gültekin** X-ray and Radio Constraints on the Mass of the Black Hole in Swift J164449.3+573451 *Astrophys. J.*, **738**, L13 (2011). /
4. **K. Gültekin** et al. Observational Selection Effects and the M–σ Relation. *Astrophys. J.*, **738**, 17, (2011).
5. M. Volonteri, P. Natarajan, & **K. Gültekin**. How Important is the Dark Matter Halo for Black Hole Growth? *Astrophys. J.*, **737**, 50 (2011).
6. K. Gebhardt et al. The Black-Hole Mass in M87 From Gemini/NIFS Adaptive Optics Observations *Astrophys. J.*, **729**, 119 (2011).
7. A. King et al. A Distinctive Disk-Jet Coupling in the Seyfert-1 AGN NGC 4051. *Astrophys. J.*, **729**, 19 (2011).
8. M. Volonteri, **K. Gültekin**, & Massimo Dotti. Gravitational Recoil: Effects on Massive Black Hole Occupation Fraction over Cosmic Time. *Mon. Not. R. Astron. Soc.*, **384**, 2143 (2010).
9. **K. Gültekin**, E. C. Cackett, J. M. Miller, T. Di Matteo, S. Markoff, & D. O. Richstone. The Fundamental Plane of Accretion Onto Black Holes with Dynamical Masses. *Astrophys. J.*, **706**, 404 (2009c).
10. **K. Gültekin** et al. The M–σ and M–L Relations in Galactic Bulges, and Determination of their Intrinsic Scatter. *Astrophys. J.*, **698**, 198 (2009b).
11. **K. Gültekin** et al. A Quintet of Black Hole Mass Determinations. *Astrophys. J.*, **695**, 1577 (2009a).
12. K. Holley-Bockelmann, **K. Gültekin**, D. Shoemaker, & N. Yunes. Gravitational Wave Recoil and the Retention of Intermediate Mass Black Holes. *Astrophys. J.*, **686**, 829 (2008).
13. M. Volonteri, F. Haardt, & **K. Gültekin**. Compact Massive Objects in Virgo Galaxies: the Black Hole Population. *Mon. Not. R. Astron. Soc.*, **384**, 1387 (2008).
14. **K. Gültekin**, M. C. Miller, & D. P. Hamilton. Three-Body Dynamics with Gravitational Wave Emission *Astrophys. J.*, **640**, 156 (2006).
15. **K. Gültekin**, M. C. Miller, & D. P. Hamilton. Growth of Intermediate-Mass Black Holes in Globular Clusters *Astrophys. J.*, **616**, 221-230 (2004).
16. D. W. Koerner, E. L. N. Jensen, K. Cruz, T. B. Guild, & **K. Gültekin**. A Single Circumbinary Disk in the HD 98800 Quadruple System *Astrophys. J. Lett.*, **533**, L37-L40 (2000).

Conference Proceedings and Other Publications

1. J. M. Miller et al., Discovery of a New Supernova Remnant in the Swift Galactic Plane Survey *ATEL* #3415 (2011)
2. D. Maitra et al., Rebrightening of MAXI J0556−332. *ATEL* #3327 (2011)
3. K. Gebhardt et al., The Black Hole Mass in M87 from Gemini/AO Observations. *BAAS*, **217**, 422.05 (2011).
3. D. Maitra, M. Reynolds, J. M. Miller, & **K. Gültekin**. X-ray, UV, Optical, and NIR Observations of Aql X-1. *ATEL* #2744 (2010)
4. **K. Gültekin**, D. Maitra, J. M. Miller, & M. Reynolds. New X-ray Activity from Aql X-1. *ATEL* #2742 (2010)
5. **K. Gültekin**. Determination of the Intrinsic Scatter in the $M_{\rm BH}$–σ and $M_{\rm BH}$–$L_{\rm bulge}$ Relations in proceedings of "Co-Evolution of Central Black Holes and Galaxies," Proceedings of the International Astronomyical Union ed. B. Peterson, IAU Symposium, **267**, 189. (2010).
6. **K. Gültekin**, E. C. Cackett, J. M. Miller, T. Di Matteo, S. Markoff, & D. O. Richstone. The Fundamental Plane of Accretion Onto Black Holes with Dynamical Masses. *BAAS*, **215**, 336.08 (2010).
7. A. Benson, K. Holley-Bockelmann, & **K. Gültekin**. The Distribution of Stars around a Super Massive Black Hole Binary Due to Three-Body Scattering. *BAAS*, **215**, 404.16 (2010).
8. **K. Gültekin** Determination of the intrinsic scatter in the M–σ and M–L relations. *IAU*, S267, arXiv:0912.3898 (2010).
9. **K. Gültekin** & D. O. Richstone. The Fundamental Plane for Nuclear Black Hole Masses. *BAAS*, **211**, 144.07 (2008).
10. K. Holley-Bockelmann, **K. Gültekin**, D. Shoemaker, & N. Yunes. Gravitational Wave Recoil and the Retention of Intermediate Mass Black Holes. *BAAS*, **211**, 49.02 (2008).
11. **K. Gültekin**, K. Holley-Bockelmann, M. C. Miller, , D. Shoemaker, & N. Yunes. Gravitational Wave Kicks of Intermediate-Mass Black Holes. *DDA*, **38**, 2.02 (2007).
12. **K. Gültekin**, M. C. Miller, & D. P. Hamilton. Three-Body Interactions of Black Holes with Gravitational Wave Emission. *BAAS*, **207**, 102.02 (2006).
13. **K. Gültekin**, M. C. Miller, & D. P. Hamilton. Three-Body Encounters of Black Holes in Globular Clusters in proceedings of the workshop "The Astrophysics of Gravitational Wave Sources," College Park, MD, April 24-26, 2003, ed. J. Centrella (Melville, NY: AIP), pp. 135-138 (2003), astro-ph/0306204.
14. **K. Gültekin**, M. C. Miller, & D. P. Hamilton. Three-Body Interactions of Black Holes in Globular Clusters. *BAAS*, **199**, 05.02 (2002).
15. D. W. Koerner, E. L. N. Jensen, K. Cruz, T. B. Guild, & **K. Gültekin**. A Single Circumbinary Disk in the HD 98800 Quadruple System. *BAAS*, **195**, 25.02 (2000).
16. **K. Gültekin**, D. W. Koerner, & M. E. Ressler. A Circumstellar Disk around the High-Mass Protostar L1206A. *BAAS*, **193**, 72.07 (1999).

Invited Seminars and Colloquia with Selected Contributed Talks

1. "Black Hole Scaling Relations: Smoking Gun or Red Herring?," University of Maryland Astronomy Department colloquium, College Park, 8 November 2011.
2. "How to Measure Black Hole Masses with X-ray and Radio (and learn everything you need to know about galaxy evolution)," University of Virginia Astronomy and NRAO joint colloquium, Charlottesville, 13 October 2011.
3. "Black Hole Scaling Relations," University of Texas Astronomy Department colloquium, Austin, 20 September 2011.
4. "Black Hole Scaling Relations," Steward Observatory and NOAO joint colloquium, University of Arizona, Tucson, 8 September 2011.
5. "Black Hole Scaling Relations and their Possible Evolution," Single and Double Black Holes Workshop, Michigan Center for Theoretical Physics, Ann Arbor, MI, 22 August 2011.
6. "New Scaling Relations: Implications for SMBH–Galaxy Co-Evolution," Evolution of Galaxies, their Central Black Holes, and their Large-Scale Environment (contributed), Astrophysical Institute Potsdam, Germany, 21 September 2010.
7. "Implications for SMBH–Galaxy Co-Evolution due to New Scaling Relations," Institute of Theoretical Astrophysics Colloquium, Heidelberg, Germany, 15 September 2010.
8. "New Scaling Relations and their Implications for SMBH–Galaxy Co-Evolution," Max Planck Institute for Astronomy special seminar, Heidelberg, Germany, 14 September 2010.
9. "The Mass of Supermassive Black Holes: New Scaling Relations," Matter and Electromagnetic Fields in Strong Gravity, University of Maryland, College Park, MD, 24 August 2009.
10. "Determination of the intrinsic scatter in the M–σ and M–L relations," IAU Symposium 267 (contributed), Evolution of Galaxies and Central Black Holes: Feeding and Feedback, Rio de Janeiro, Brazil, 12 August 2009.
11. "The IMBH–SMBH Connection," Intermediate-Mass Black Holes: from First Light to Galactic Nuclei, UC Irvine Center for Cosmology, Irvine, CA, 2 April 2009.
12. "Scatting about M–σ," Astronomy Department Colloquium, University of Michigan, Ann Arbor, MI, 4 December 2008.
13. "Growing Intermediate-Mass Black Holes with Gravitational Waves," Extra-Galactic Astronomy Seminar, Austin, TX, 21 September 2006.
14. "Growing Black Holes in Globular Clusters," Galactic Nuclei Workshop, Leiden, The Netherlands, 27 July 2006.
15. "Growth of Intermediate-Mass Black Holes in Globular Clusters and their Gravitational Waves," Space Sciences Seminar, George Mason, Fairfax, VA, 14 September 2005.
16. "Making IMBHs and Gravitational Waves in Globular Clusters," Astronomy Seminar, Caltech, Pasadena, CA, 6 December 2004.
17. "The Role of Three-Body Encounters in IMBH Formation," Center for Astrophysical Sciences Seminar, Johns Hopkins University, Baltimore, MD, 16 November 2004.
18. "From Newtonian Dynamics to Gravitational Waves," University of Pennsylvania Astrophysics Seminar, Philadelphia, PA, 20 October 2004.

19. "Growing IMBHs in Globular Clusters," University of Virginia and NRAO Seminar, Charlottesville, VA, 19 October 2004.
20. "The Role of Three-Body Encounters in IMBH Formation and their Gravitational Waves," LHEA Seminar, GSFC, Greenbelt, MD, 15 October 2004.
21. "Close Encounters of the Three-Body Kind," Penn State Seminar, State College, PA, 3 March 2003.

Grants and Awards

2011 *HST* Cycle 19 (ID GO-12557, 11 orbits, $80k, Phase II pending).
2011 *Chandra* Cycle 13 (ID 13700129, 101 ksec [plus 7 hours EVLA], $65k, Phase II pending).
2009 *Chandra* Cycle 11 Large Proposal (ID 11900514, 360 ksec, $165k, Phase II accepted).
2006 AAS International Travel Grant.
2006 Jacob K. Goldhaber Travel Grant.

Professional Societies and Activities

2011 – present Chair of the SOC for Black Holes by the Black Sea, Istanbul, Turkey
2010 – 2011 . . U. Mich. Astronomy Colloquium co-organizer.
2010 . . . . . Reviewer, Cycle 12 *Chandra* Proposal Peer Review
2010 – 2011 . . SOC for "Single and Double Black Holes" Workshop, Ann Arbor, MI
2006 – present Referee for *ApJ.*, *ApJL.*, *MNRAS.*, and *A&A*
2009 – 2010 . . "Extreme Astrophysics" seminar series co-organizer, U. Mich.
2008 – 2009 . . U. Mich. Astronomy Colloquium co-organizer.
2007 . . . . . "Accretion Research Topics" discussion organizer, U. Mich.
2006 – present American Astronomical Society Full Member.
1999 – 2006 . . American Astronomical Society Junior Member.

Mentoring Experience

2008 *Primary Mentor* for Kan Yang's undergraduate, senior independent study. Kan Yang made an online "Supermassive Black Hole Encyclopedia" for the community. The web page lists galaxies with dynamical measurements or limits of the mass of their central black holes. The web page also lists important, basic galaxy properties and is cross-linked with ADS and NED, and it will be online soon.

2008 - present *Co-Mentor* for Michael Katolik's undergraduate, independent study. Michael Katolik is developing a code under supervision to model the kinematics of gas disks in galaxy nuclei for comparison to publicly available *HST* data to estimate black hole masses.

Teaching and Public Outreach Experience

2009 - 2010 *Guest lecturer* for undergraduate astronomy courses "The Solar System, Search for Life," "Introduction to Astrophysics," and "Astrobiology;" and graduate astronomy course "Cosmology," U. Mich.

2004 - 2006 *Guest lecturer* for graduate astronomy courses "Numerical Astrophysics" and "Introduction to Research," U. MD.

2000 - 2001 *Instructor* for astronomy observing class at U. MD. Planned, facilitated, and taught class for undergraduate non-majors in use of small telescopes and naked-eye observations.

1999 - 2004 *Telescope operator*, facilitator, and educational reference for department open houses and special public events at U. MD.

1999 - 2000 *Teaching Assistant* for introductory astronomy classes. Taught discussion session, graded, and led special review sessions for undergraduate classes at U. MD.