

# David C. Moore

Wright Laboratory  
Department of Physics  
Yale University  
New Haven, CT 06511

Phone: (203) 432-7986  
Email: david.c.moore@yale.edu

## Education

Ph.D., Physics, California Institute of Technology, 2012

Dissertation title: *“A search for low-mass dark matter with the Cryogenic Dark Matter Search and the development of highly-multiplexed phonon-mediated particle detectors”*

Adviser: Prof. Sunil Golwala

B.S., Physics, Mathematics, Yale University, 2006

*magna cum laude*, with distinction in both majors

## Academic Appointments

2016-present: Assistant Professor of Physics, Yale University

2012-2016: Postdoctoral Scholar, Stanford University

## Research positions

2019-present: Subsystem Scientist for nEXO Photon Detector

2017-present: Elected member of nEXO Executive Council

2016-present: EXO-200/nEXO collaboration board member

2016-2019: nEXO L2 manager for “Interconnections”

2015-2017: EXO-200 analysis coordinator

2006-2012: Graduate research assistant, California Institute of Technology

2005-2006: Undergraduate researcher, Yale University

2004: Summer research internship, Fermilab

2003: Summer researcher, Universidad de Chile and Yale University

## Teaching

Phys 165L: *General Physics Laboratory*, Yale, Fall 2019

Phys 430: *Electromagnetic Fields & Optics*, Yale, Spring 2019

Phys 469/Phys 471: *Independent Projects in Physics*, Yale, Fall 2018

Phys 472: *Independent Projects in Physics*, Yale, Spring 2017

Phys 205L/Phys 206L: *Modern Physical Measurement I&II*, Yale, Fall 2016

Graduate teaching assistant, Physics 3: *Freshman physics laboratory*, Caltech, 2006–2007

## Honors and awards

Alfred P. Sloan Research Fellowship in Physics, 2018  
NSF Early Career Award, 2017  
Lee Grodzins Postdoctoral Award, MIT, 2015  
Mitsuyoshi Tanaka Dissertation Award in Experimental Particle Physics, APS, 2013  
John Stager Stemple Memorial Prize in Physics, Caltech, 2009  
NSF Graduate Research Fellowship Program, Honorable Mention, 2006  
Howard L. Schultz Prize in Physics, Yale, 2006  
Anthony D. Stanley Prize in Mathematics, Yale, 2006  
De Forest Senior Prize in Mathematics, Yale, 2006  
National Merit Scholarship, 2002

## Outreach

Designed and taught week long summer enrichment program on the “Physics of Light” through the Yale Pathways Summer Scholar program, Summer 2018-present  
Led two demo sessions for “Pathways to Science at Wright Lab: Discover the invisible universe”, May 2018  
Volunteer for Yale Physics Olympics, October 2016  
High school mentor, Caltech Classroom Connection, provided outreach activities in high school physics classes in the Pasadena Unified School District, 2007–2011

## Professional service and memberships

Referee for Phys. Rev. C, Phys. Rev. D, Eur. J. Phys. C, NIM A, Opt. Comm., and IEEE Trans. Appl. Supercond.  
Proposal reviewer for DOE and NSF, NSF panelist (2018)  
Co-organizer of “Quantum Optomechanical Architectures for Dark Matter Detection” workshop (2019); Program committee member for “Optical Trapping and Optical Micromanipulation XVI”, San Diego, 2019; APS Deborah Jin Award Selection Committee member, 2019-2020; LOC member for “Symmetries and Order”, Yale, 2018; LOC member for National Nuclear Physics Summer School, Yale, 2018; Co-organizer of “Tabletop experiments” workshop, MIT, 2017; Co-convener for “Exploring the unknown” session at Coordination Panel for Advanced Detector R&D (CPAD) workshop, 2016  
Member of the American Physical Society

## Selected publications

1. G. Anton et al., “Search for Neutrinoless Double-Beta Decay with the Complete EXO-200 Dataset,” Phys. Rev. Lett. 123, 161802 (2019) arXiv:1906.02723. (*PRL Editor’s suggestion*)
2. C. Chambers et al., “Imaging individual barium atoms in solid xenon for barium tagging in nEXO,” Nature 569, 203 (2019), arXiv:1806.10694.
3. F. Monteiro, S. Ghosh, E.C. van Assendelft, and D.C. Moore, “Optical Rotation of Levitated Spheres in High Vacuum,” Phys. Rev. A 97, 051802(R) (2018), arXiv:1803.04297 (*PRA Editor’s suggestion*).
4. F. Monteiro, S. Ghosh, A.G. Fine, and D.C. Moore, “Optical levitation of 10 nanogram spheres with nano-g acceleration sensitivity,” Phys. Rev. A, 96, 063841 (2017), arXiv:1711.04675.

5. J.B. Albert et al., "Sensitivity and Discovery Potential of nEXO to Neutrinoless Double Beta Decay," *Phys. Rev. C* 97, 065503 (2018), arXiv:1710.05075.
6. A.D. Rider, D.C. Moore, C.P. Blakemore, M. Louis, M. Lu, G. Gratta, "Search for Screened Interactions Below the Dark Energy Length Scale Using Optically Levitated Microspheres," *Phys. Rev. Lett.*, 117, 101101 (2016), arXiv:1604.04908.
7. D.C. Moore, A.D. Rider, and G. Gratta, "Search for Millicharged Particles Using Optically Levitated Microspheres," *Phys. Rev. Lett.*, 113, 251801 (2014), arXiv:1408.4396 (*Featured in APS Physics "Synopsis"*).
8. J.B. Albert et al., "Search for Majorana neutrinos with the first two years of EXO-200 data," *Nature* 510, 229 (2014), arXiv:1402.6956.
9. Z. Ahmed et al., "Results from a Low-Energy Analysis of CDMS II Germanium Data," *Phys. Rev. Lett.* 106, 131302 (2011), arXiv:1011.2482 (*PRL Editor's suggestion*).
10. Z. Ahmed et al., "Dark matter search results from the CDMS II experiment," *Science* 327, 1619 (2010), arXiv:0912.3592.

## Conference presentations

1. \*Photonics Asia, West-Lake Photonics Symposium, Hangzhou, China, October 20, 2019
2. \*ITAMP Laboratory Cosmology Workshop, Harvard CfA, Cambridge, MA, September 17, 2019
3. \*Levitated Optomechanics (699th WE-Heraeus-Seminar), Bad Honnef, Germany, August 1, 2019
4. \*Indirect Searches for New Physics across the Scales, Mainz Institute for Theoretical Physics (MITP), Mainz, Germany, June 18, 2019
5. \*First Arizona Workshop on Precision Searches for Fundamental Physics (AZPP2019), Tempe, AZ, February 4, 2019
6. New Technologies for Discovery IV: The CPAD Instrumentation Frontier Workshop, Providence, RI, December 12, 2018
7. \*Quantum Engineering of Levitated Systems, Benasque, Spain, September 17, 2018
8. \*Optical Trapping and Optical Micromanipulation XV, San Diego, CA, August 20, 2018
9. \*High Energy Physics at the Sensitivity Frontier, Kavli Institute for Theoretical Physics, Santa Barbara, CA, April 3, 2018
10. \*Beyond the Standard Model in Tabletop Experiments, Weizmann Institute, Rehovot, Israel, November 15, 2017
11. \*APS Division of Nuclear Physics, Pittsburgh, PA, October 28, 2017
12. \*International Workshop on Baryon & Lepton Number Violation, Case Western Reserve University, Cleveland, OH, May 15, 2017
13. \*52nd Rencontres de Moriond, Electroweak Interactions And Unified Theories, La Thuile, Italy, March 23, 2017
14. \*Sub-eV Dark Matter Workshop, LBNL, Berkeley, CA, December 9, 2016
15. \*Workshop on Statistical Issues in Experimental Neutrino Physics, Fermilab, Batavia, IL, September 20, 2016
16. \*Dark Energy in the Laboratory, Royal Society at Chicheley Hall, Buckinghamshire, UK, April, 22, 2016
17. 28th Texas Symposium on Relativistic Astrophysics, Geneva, Switzerland, December 14, 2015
18. \*Workshop on Dark Matter Direct Detection, LBNL, Berkeley, CA, June 9, 2015
19. 20th Particles and Nuclei International Conference, Hamburg, Germany, August 23, 2014
20. 24th Workshop on Weak Interactions and Neutrinos, Natal, Brazil, September 19, 2013

21. \*Tanaka Dissertation Prize Lecture, APS DPF 2013, Santa Cruz, CA, August 27, 2013
22. Low Temperature Detectors 14, Heidelberg, Germany, August 4, 2011
23. 4th Workshop on the Physics and Applications of Superconducting Microresonators, Grenoble, France, July 29, 2011
24. APS April Meeting, Anaheim, CA, May 2, 2011
25. Aspen Winter Conference on Indirect and Direct Detection of Dark Matter, Aspen, CO, February 10, 2011
26. \*Physics of the Universe Summit 2011, Hawthorne, CA, January 8, 2011
27. APS April Meeting, Washington, DC, February 13, 2010
28. 3rd Workshop on the Physics and Applications of Superconducting Microresonators, Santa Barbara, CA, January 22, 2010
29. Low Temperature Detectors 13 (poster), Stanford, CA, July 23, 2009
30. 24th International Symposium on Lattice Field Theory (poster), Tucson, AZ, July 25, 2006

\*Invited

## Colloquia and seminars

1. CoQuS Colloquium, University of Vienna, Vienna, Austria, October 14, 2019
2. Physics Colloquium, University of Albany, Albany, NY, September 27, 2019
3. HEP Seminar, Penn State University, State College, PA, October 24, 2018
4. Physics Colloquium, Amherst College, Amherst, MA, February 6, 2018
5. Physics Colloquium, Yale University, New Haven, CT, January 22, 2018
6. Neutrino Seminar Series, Fermilab, Batavia, IL, October 19, 2017
7. AFCI Seminar, University of Massachusetts, Amherst, MA, April 18, 2017
8. 3IT Seminar, Sherbrooke University, Quebec, Canada, April 7, 2017
9. Particle and Astroparticle Seminar, McGill University, Montreal, Canada, April 6, 2017
10. Particle Physics Seminar, Stony Brook University, Stony Brook, NY, April 3, 2017
11. KICP Seminar, University of Chicago, Chicago, IL, March 10, 2017
12. SLAC Experimental Particle Physics Seminar, Menlo Park, CA, March 17, 2016
13. Physics Colloquium, University of Colorado, Boulder, CO, March 14, 2016
14. Physics Colloquium, University of Alabama, Tuscaloosa, AL, March 2, 2016
15. Nuclear, Particle, and Astrophysics Seminar, Yale University, New Haven, CT, February 25, 2016
16. Nuclear and Particle Physics Colloquium, MIT, Cambridge, MA, February 22, 2016
17. HEP-Astro Seminar, University of Michigan, Ann Arbor, MI, February 1, 2016
18. HEAP Seminar, University of California, Los Angeles, CA, January 28, 2016
19. Physics Colloquium, Virginia Tech, Blacksburg, VA, January 25, 2016
20. High Energy Physics Seminar, Caltech, Pasadena, CA, January 12, 2016
21. Physics Colloquium, New Mexico State University, Las Cruces, NM, November 12, 2015
22. Lee Grodzins Postdoctoral Award Colloquium, MIT, Cambridge, MA, September 14, 2015
23. Physics Colloquium, University of Texas, Austin, TX, February 23, 2015
24. Nuclear, Particle, and Astrophysics Seminar, Yale University, New Haven, CT, February 19, 2015
25. Laboratory for Particle Physics and Cosmology Seminar, Harvard University, Cambridge, MA, February 18, 2015
26. Astronomy and Physics Seminar, University of California, Berkeley, CA, February 12, 2015

27. Center for Particles and Fields Seminar, University of Texas, Austin, TX, January 23, 2015
28. Kavli Institute for Particle Astrophysics and Cosmology Tea Talk, Menlo Park, CA, March 14, 2014
29. Particle Astrophysics Seminar, McGill University, Montreal, Canada, March 28, 2012
30. HEPL Seminar, Stanford University, Stanford, CA, March 21, 2012
31. Observational Cosmology Seminar, Caltech, Pasadena, CA, June 2, 2011
32. Fermilab Particle Astrophysics Seminar, Batavia, IL, February 21, 2011
33. Observational Cosmology Seminar, Caltech, Pasadena, CA, February 3, 2011
34. High Energy Physics Seminar, Caltech, Pasadena, CA, February 8, 2010

## All publications

1. G. Gallina et al., "Characterization of the Hamamatsu VUV<sub>4</sub> MPPCs for nEXO," Nucl. Instrum. Meth. Phys. Res. A, 940, 371 (2019), arXiv:1903.03663.
2. S. Ghosh et al., "Fabrication of large vaterite microspheres for optical trapping and rotation in high vacuum," SPIE Proc 11083, Optical Trapping and Optical Micromanipulation XVI; 1108317 (2019).
3. Z. Li et al., "Simulation of charge readout with segmented tiles in nEXO," JINST 14 P09020 (2019), arXiv:1907.07512.
4. G. Anton et al., "Search for Neutrinoless Double-Beta Decay with the Complete EXO-200 Dataset," Phys. Rev. Lett. 123, 161802 (2019) arXiv:1906.02723. (*PRL Editor's suggestion*)
5. C. Chambers et al., "Imaging individual barium atoms in solid xenon for barium tagging in nEXO," Nature 569, 203 (2019), arXiv:1806.10694.
6. X.L. Sun et al., "Study of silicon photomultiplier performance in external electric fields," JINST 13 T09006 (2018), arXiv:1807.03007.
7. A. Jamil et al., "VUV-sensitive Silicon Photomultipliers for Xenon Scintillation Light Detection in nEXO," IEEE Trans. Nucl. Sci. 65, 2823 (2018), arXiv:1806.02220.
8. R. Agnese et al., "Nuclear-recoil energy scale in CDMS II silicon dark-matter detectors," Nucl. Instr. Meth. Phys. Res. A 905, 71 (2018), arXiv:1803.02903.
9. S. Al Kharusi et al., "nEXO Pre-Conceptual Design Report," arXiv:1805.11142 (2018).
10. S. Delaquis et al., "Deep neural networks for energy and position reconstruction in EXO-200," JINST 13, P08023 (2018), arXiv:1804.09641.
11. F. Monteiro, S. Ghosh, E.C. van Assendelft, and D.C. Moore, "Optical Rotation of Levitated Spheres in High Vacuum," Phys. Rev. A 97, 051802(R) (2018), arXiv:1803.04297.
12. A.D. Rider, C.P. Blakemore, G. Gratta, and D.C. Moore, "Single-beam Dielectric Microsphere Trapping with Optical Heterodyne Detection," Phys. Rev. A 97, 013842 (2018), arXiv:1710.03558.
13. J.B. Albert et al., "Search for Neutrinoless Double-Beta Decay with the Upgraded EXO-200 Detector," Phys. Rev. Lett. 120, 072701 (2018), arXiv:1707.08707.
14. M. Jewell et al., "Characterization of an Ionization Readout Tile for nEXO," JINST 13 P01006 (2018), arXiv:1710.05109.
15. J.B. Albert et al., "Sensitivity and Discovery Potential of nEXO to Neutrinoless Double Beta Decay," Phys. Rev. C 97, 065503 (2018), arXiv:1710.05075.
16. J.B. Albert et al., "Search for nucleon decays with EXO-200" Phys. Rev. D 97, 072007 (2018), arXiv:1710.07670.
17. F. Monteiro, S. Ghosh, A.G. Fine, and D.C. Moore, "Optical levitation of 10 nanogram spheres with nano-g acceleration sensitivity," Phys. Rev. A, 96, 063841 (2017), arXiv:1711.04675.
18. J.B. Albert et al., "Searches for Double Beta Decay of <sup>134</sup>Xe with EXO-200," Phys. Rev. D 96, 092001 (2017), arXiv:1704.05042.

19. D.S. Leonard et al., "Trace radioactive impurities in final construction materials for EXO-200," Nucl. Instrum. Meth. A 871, 169 (2017), arXiv:1703.10799.
20. J.B. Albert et al., "Measurement of the Drift Velocity and Transverse Diffusion of Electrons in Liquid Xenon with the EXO-200 Detector," Phys. Rev. C, 95, 025502 (2016), arXiv:1609.04467.
21. A.D. Rider, D.C. Moore, C.P. Blakemore, M. Louis, M. Lu, G. Gratta, "Search for Screened Interactions Below the Dark Energy Length Scale Using Optically Levitated Microspheres," Phys. Rev. Lett., 117, 101101 (2016), arXiv:1604.04908.
22. C.G. Davis et al., "An Optimal Energy Estimator to Reduce Correlated Noise for the EXO-200 Light Readout," JINST 11, P07015 (2016), arXiv:1605.06552.
23. J.B. Albert et al., "First search for Lorentz and CPT violation in double beta decay with EXO-200," Phys. Rev. D 93, 072001 (2016), arXiv:1601.07266.
24. J.B. Albert et al., "Cosmogenic Backgrounds to  $0\nu\beta\beta$  in EXO-200," JCAP 04, 029 (2016), arXiv:1512.06835.
25. J.B. Albert et al., "Search for  $2\nu\beta\beta$  decay of  $^{136}\text{Xe}$  to the  $0^+1$  excited state of  $^{136}\text{Ba}$  with EXO-200," submitted to Phys. Rev. C (2015), arXiv:1511.04770.
26. J.B. Albert et al., "Measurements of the ion fraction and mobility of alpha and beta decay products in liquid xenon using EXO-200," Phys. Rev. C 92, 045504 (2015), arXiv:1506.00317.
27. J.B. Albert et al., "Investigation of radioactivity-induced backgrounds in EXO-200," Phys. Rev. C 92, 015503 (2015), arXiv:1503.06241.
28. T. Brunner et al., "An RF-only ion-funnel for extraction from high-pressure gases," Int. J. Mass Spec. 379, 110 (2015), arXiv:1412.1144.
29. B. Mong et al., "Spectroscopy of Ba and Ba+ deposits in solid xenon for barium tagging in nEXO," Phys. Rev. A 91, 022505 (2014), arXiv:1410.2624.
30. R. Agnese et al., "Maximum Likelihood Analysis of Low Energy CDMS II Germanium Data," Phys. Rev. D 91, 052021 (2014), arXiv:1410.1003.
31. J.B. Albert et al., "Search for Majoron-emitting modes of double-beta decay of  $^{136}\text{Xe}$  with EXO-200," Phys. Rev. D 90, 092004 (2014), arXiv:1409.6829.
32. R. Agnese et al., "First direct limits on Lightly Ionizing Particles with electric charge less than  $e/6$ ," Phys. Rev. Lett. 114, 111302 (2014), arXiv:1409.3270.
33. D.C. Moore, A.D. Rider, and G. Gratta, "Search for Millicharged Particles Using Optically Levitated Microspheres," Phys. Rev. Lett., 113, 251801 (2014), arXiv:1408.4396.
34. K. Twelker et al., "An apparatus to manipulate and identify individual Ba ions from bulk liquid Xe," Rev. Sci. Instrum. 85, 095114 (2014), arXiv:1407.0618.
35. J.B. Albert et al., "Search for Majorana neutrinos with the first two years of EXO-200 data," Nature 510, 229 (2014), arXiv:1402.6956.
36. R. Agnese et al., "Search for Low-Mass Weakly Interacting Massive Particles Using Voltage-Assisted Calorimetric Ionization Detection in the SuperCDMS Experiment," Phys. Rev. Lett. 112, 041302 (2014), arXiv:1309.3259.
37. J.B. Albert et al., "An improved measurement of the  $2\nu\beta\beta$  half-life of Xe-136 with EXO-200," Phys. Rev. C 89, 015502 (2014), arXiv:1306.6106.
38. R. Agnese et al., "Demonstration of Surface Electron Rejection with Interleaved Germanium Detectors for Dark Matter Searches," Appl. Phys. Lett. 103, 164105 (2013), arXiv:1305.2405.
39. R. Agnese et al., "Silicon Detector Dark Matter Results from the Final Exposure of CDMS II," Phys. Rev. Lett. 111, 251301 (2013), arXiv:1304.4279.
40. R. Agnese et al., "Silicon detector results from the first five-tower run of CDMS II," Phys. Rev. D 88, 031104 (2013), arXiv:1304.3706.
41. D.C. Moore, "A search for low-mass dark matter with the cryogenic dark matter search and the development of highly multiplexed phonon-mediated particle detectors," Ph.D. thesis, California Institute of Technology (2012).

42. D.C. Moore et al., "Position and energy-resolved particle detection using phonon-mediated microwave kinetic inductance detectors," *Appl. Phys. Lett.* 100, 232601 (2012), arXiv:1203.4549.
43. Z. Ahmed et al., "Search for annual modulation in low-energy CDMS II data" (2012), arXiv:1203.1309.
44. D.C. Moore et al., "Phonon mediated microwave kinetic inductance detectors," *J. Low Temp. Phys.* 167, 329 (2012).
45. Z. Ahmed et al., "Combined Limits on WIMPs from the CDMS and EDELWEISS Experiments," *Phys. Rev. D* 84, 011102 (2011), arXiv:1105.3377.
46. Z. Ahmed et al., "Search for inelastic dark matter with the CDMS II experiment," *Phys. Rev. D* 83, 112002 (2011), arXiv:1012.5078.
47. Z. Ahmed et al., "Results from a Low-Energy Analysis of CDMS II Germanium Data," *Phys. Rev. Lett.* 106, 131302 (2011), arXiv:1011.2482.
48. D.S. Akerib et al., "A low-threshold analysis of CDMS shallow-site data," *Phys. Rev. D* 82, 122004 (2010), arXiv:1010.4290.
49. B.A. Mazin et al., "ARCONS: A highly multiplexed superconducting optical to near-IR camera," *Proc. SPIE* 7735, 773518 (2010).
50. H.G. LeDuc et al., "Titanium Nitride Films for Ultrasensitive Microresonator Detectors," *Appl. Phys. Lett.* 97, 102509 (2010).
51. Z. Ahmed et al., "Dark matter search results from the CDMS II experiment," *Science* 327, 1619 (2010), arXiv:0912.3592.
52. Z. Ahmed et al., "Analysis of the low-energy electron-recoil spectrum of the CDMS Experiment," *Phys. Rev. D* 81, 042002 (2010), arXiv:0907.1438.
53. Z. Ahmed et al., "Search for Axions with the CDMS Experiment," *Phys. Rev. Lett.* 103, 141802 (2009), arXiv:0902.4693.
54. D.C. Moore et al., "Quasiparticle Trapping in Microwave Kinetic Inductance Strip Detectors," LTD-13, AIP Conf. Proc. 1185, 168 (2009).
55. D.N. Seitz et al., "SuperCDMS Detector Readout Cryogenic Hardware," LTD-13, AIP Conf. Proc. 1185, 282 (2009).
56. N. Mirabolfathi et al., "The Cryogenic Dark Matter Search (CDMS) Experiment: Results, Status, and Perspective," LTD-13, AIP Conf. Proc. 1185, 623 (2009).
57. C.N. Bailey et al., "Bulk and Surface Charge Collection: CDMS Detector Performance and Design Implications," LTD-13, AIP Conf. Proc. 1185, 643 (2009).
58. P.L. Brink et al., "SuperCDMS Detector Fabrication Advances," LTD-13, AIP Conf. Proc. 1185, 655 (2009).
59. Z. Ahmed et al., "Characterization of SuperCDMS 1-inch Ge Detectors," LTD-13, AIP Conf. Proc. 1185, 659 (2009).
60. N.G. Czakon et al., "Microwave Kinetic Inductance Detector (MKID) Camera Testing for Submillimeter Astronomy," ISSTT2009, P8F (2009).
61. O. Noroozian et al., "Development of Low-Noise Multiband Imaging Arrays using Microwave Kinetic Inductance Detectors (MKID) for Ground-based Submillimeter Astronomy," ISSTT2009, T2A (2009).
62. S. Golwala et al., "A WIMP Dark Matter Detector Using MKIDs," *J. Low Temp. Phys.* 151, 550 (2008).
63. D.C. Moore and G.T. Fleming, "The effect of reduced spatial symmetries on lattice states: results for non-zero linear momentum," *PoS(LAT2006)* 190-195 (2006).
64. D.C. Moore and G.T. Fleming, "Multiparticle states and the hadron spectrum on the lattice," *Phys. Rev. D* 74, 054504 (2006), arXiv:hep-lat/0507018.
65. D.C. Moore and G.T. Fleming, "Angular momentum on the lattice: The case of nonzero linear momentum," *Phys. Rev. D* 73, 014504 (2006), Erratum *ibid.* 74, 079905 (2006), arXiv:hep-lat/0507018.

66. E. Gawiser et al., "The Multiwavelength Survey by Yale-Chile (MUSYC): Survey Design and Deep Public UBVRIZ' Images and Catalogs of the Extended Hubble Deep Field-South," *Astrophys. J. Suppl.* 162, 1 (2006), arXiv:astro-ph/0509202.