Robert A. Knop Jr.
Vanderbilt University
Dept. of Physics and Astronomy
VU Station B 351807
Nashville, TN 37235-1807
(615)322-6165 — E-mail: r.knop@vanderbilt.edu

Research and Teaching Experience

2001–Present **Assistant Professor of Physics & Astronomy, Vanderbilt University**. Teaching undergraduate and graduate astronomy and astrophysics courses including introductory astronomy, galactic astrophysics, general relativity, and graduate nebular astrophysics. Performing research on starburst, active, and interacting galaxies; on Type-Ia supernova progenitors; and on supernova cosmology (in collaboration with the Supernova Cosmology Project).

1996–2001 **Postdoctoral Fellow with the Supernova Cosmology Project** at the Lawrence Berkeley National Laboratory. Led the software and data analysis effort for four years of successful supernova searches. Led analysis of photometric followup data, producing lightcurves for supernovae that allowed discovery and measuremetn of the universe's acceleration. Performed photometric and spectroscopic observations at world-class telescopes. Supervised graduate and undergraduate students. Maintained computers for scientific use.

1994–1996 **Teaching Assistant, Physics 1, California Institute of Technology**. Section leader for Physics 1a, 1b, and 1c for two years. Material covered included electricity, magnetism, and special relativity. Physics 1b and 1c included an electronics laboratory component.

1991–1996 **Graduate Student Research Assistant, California Institute of Technology.** Designed and constructed a successful infrared spectrometer for the Palomar 5 meter telescope in collaboration with another student in the Infrared Astronomy group. Used this instrument to obtain and analyze spatially resolved near-infrared spectra of Seyfert galaxies, forming the basis of a Ph.D. thesis with Dr. Tom Soifer.

1987–1990 **Summer Student Research Assistant at the 88-Inch Cyclotron, Lawrence Berkeley National Laboratory.** Developed techniques for the analysis of nuclear physics data, created a software package to perform statistical calculations on the decay of excited nuclei, investigated the laser calibration of scintillator detectors, and participated in data analysis over the course of four summers as a research assistant, working with Drs. Robert Stokstad and Yuen-Dat Chan.

Education

1997 **Ph.D., Physics, California Institute of Technology**.
Thesis Title: "Spatially Resolved Infrared Spectroscopy of Seyfert Galaxies"
Advisor: B. T. Soifer
1992 **M.S., Physics, California Institute of Technology.**
1990 **B.S., Physics, Harvey Mudd College**.

Honors and Awards

2004	Chancellor's Award for Research, Vanderbilt University
1991-1994	Kodak Fellow, Caltech.
1990	Graduated with Honors in Physics and in Humanities/Social Sciences, Harvey Mudd College.
1990	Radley Prize in Humanities and Social Sciences, Harvey Mudd College.
1987	Platt Prize for outstanding Freshman, Harvey Mudd College.

Computer Skills

- **Programming Languages**
  - Proficient in C, C++, Perl.
  - Familiar with Java, FORTRAN, Python, SQL, IDL, LSL, Bash, BASIC, 6502 assembly, 68000 assembly, and other languages.
  - Familiar with Unix programming, with GNU autoconf, with Subversion revision control software, and with the Unix libraries pgsql, gtk+, gtkmm, gdome, gsl, and others.
  - Able to learn computer languages quickly.
- **Project Experience**
  - Maintained and oversaw the group of people who worked on the large data analysis package used by the Supernova Cosmology Project, a combination C/IDL package, from 1996-2003.
  - Rewrote from scratch, twice, the software used for image subtraction and the user interface for scanning image subtractions used to find the supernovae that led to the discovery of the accelerating Universe. This software took multiple images taken in different sky conditions at different times. Images from a "reference" and "search" run were first aligned (by finding objects and performing image transformations), and then summed. The atmospheric blurring of the summed reference and summed search image had to be matched; I did algorithm development to improve this matching. The two images are subtracted, and the difference is scanned for residuals. A user interface then provides scientists with information and images about each of the residuals, and allows updating of a supernova candidate database.
  - Rewrote the basic framework for image reduction and SQL database software, converting the software from IDL to a set of C++ classes. Initially, this database existed as a flat-file that was read and searched in memory whenever anybody would start IDL. Because IDL is a continuing environment, this means that changes made to the database by others before one started the environment weren't seen. Additionally, while in-memory

searches were fast, they did not scale. I converted the database to an SQL database of information about supernova candidates, objects on fields, and header information for images. Combined with a filesystem database of images (indexed by the SQL database), this provided a system that scaled better and allowed for global access to the real-time updated information that was common during a supernova search campaign. Later, I created a CGI interface that allowed remote sites to keep local mirrors of the image data files synced with what is in the database; initially, only those who were able to NSF mount the data disks could make full use of the database.

- **Cluster Experience**
  - Conversant with MPI. Wrote a fully parallel data analysis program, and a fully parallel cosmology fitting package used to determine estimates of cosmological parameters (mass density, dark energy density) from supernova data.
  - Utilized a 32-node cluster as a "node farm" to run single-processor jobs as more data became available. Have built and individually maintained smaller scale clusters, including a 4-node cluster of laptops put together in an ad-hoc fashion at an observatory in Chile for rapid data analysis.
- **Administration, OS, and Other Computer Experience**
  - In addition to regular post-doc duties, was sysadmin for 20-30 Linux servers and workstations (plus a 5-node cluster) for the Supernova Cosmology Project at LBNL. Much of the time these machines used a custom kernel rather than the one packaged with the distribution. I also adapted and rewrote a system for keeping track of configuration files modified from the distribution. With that system, I could wipe a disk, reinstall the operating system, and have all of the configuration file customizations unique to that system reinstalled in little more time than it took to run through the Linux distribution install.
  - Currently manage 8 Linux workstations used by myself, students, and other astronomers.
  - Closely familiar with the Debian testing distribution. Have used Slackware and Red Hat Linux distributions in the past. Have used Knoppix (primarily as a system administration aid), even though the "Knop" does not refer to me.
  - Familiar with installing, compiling, and using kernels and system libraries on Linux.
  - Prefer emacs, but have respect for those who prefer vi.
  - Familiar with web programming, including HTML and XHTML, Java applets, CGI; have created and maintained web services using all of those technologies. Have administered Apache web servers.
  - Familiar with OpenOffice.org (Writer, Impress, Draw, Calc), Blender, the Gimp, LaTeX, Xfig, standard Unix shell utilities, and others.
  - Past co-creator of the website "The Dramatic Exchange," and past volunteer webmaster for Grey Ghost Press, Inc.
  - Passingly familiar with Solaris (6 years ago), Windows, MacOS, Samba servers for Windows file and printer sharing from Unix.

Students Advised

- Katie Chynoweth, PhD Student, Vanderbilt University, entered 2005
- Cameron Pittman, Undergraduate Research Student, 2006-present
- Andrew Collazzi, Undergraduate Honors Thesis, Vanderbilt University, 2006
- Eric Smith, MS, Physics, Vanderbilt University, 2005
- Naved Mahmud, Undergraduate Honors Thesis, Vanderbilt University, 2005 (High Honors)
- Jonathan Stricker, Undergraduate Honors Thesis, Vanderbilt University, 2005 (High Honors)
- James Schlaerth, Undergraduate Honors Thesis, Vanderbilt University, 2004 (High Honors)
- René Ortmann, MS, Physics, Vanderbilt University, 2003
- Jessica Hodges, Undergraduate Research, Vanderbilt University, 2002
- K. Sterling Garmond, Summer Undergraduate Research, LBNL, 2000

Professional Activities and Society Memberships

2006–Present	AAS Shapley Lecturer
2007	Member, AAS Small Research Grants Panel (January)
2005–2007	Member, Extragalactic Time Allocation Committee, NOAO
2004–2005	Referee for *The Astrophysical Journal*
1999	Referee for *The Astronomical Journal*
1990–Present	Member, The American Physical Society
1992–Present	Member, The American Astronomical Society
2002–Present	Member, The Astronomical Society of the Pacific
2007–Present	Member, American Association of Physics Teachers

Additional Skills and Experience

- **Music**: Violinist since the age of five, violist since 1995. Was principal second violinist for the Occidental–Caltech Symphony Orchestra, 1990-1996. Currently playing viola with the all-volunteer Nashville Philharmonic.
- **Theatre**: Accomplished amateur actor. Numerous roles acting in, directing, stage managing, and producing community theater productions, most recently with the Contra-Costa Civic Theatre in El Cerrito, CA (through 2001).
- **Blogging**: Mildly recognized science blogger (http://www.scienceblogs.com/interactions). My blog is a combination of my own personal views on world and local events, popular-level descriptions of recent scientific results, and popular-level expositions of basic and important concepts in physics and astronomy.
- **Unicycle**: Can ride a unicycle forwards, but not backwards.

PUBLICATIONS

Refereed Journal Articles

1. A. Conley, G. Goldhaber, L. Wang, G. Aldering, R. Amanullah, E. D. Commins, V. Fadeyev, G. Folatelli, G. Garavini, R. Gibbons, A. Goobar, D. E. Groom, I. Hook, D. A. Howell, A. G. Kim, R. A. Knop, M. Kowalski, N. Kuznetsova, C. Lidman, S. Nobili, P. E. Nugent, R. Pain, S. Perlmutter, E. Smith, A. L. Spadafora, V. Stanishev, M. Strovink, R. C. Thomas, W. M. Wood-Vasey, "Measurement of $\Omega_{\rm M}$, Ω_Λ from a Blind Analysis of Type Ia Supernovae with CMAGIC: Using Color Information to Verify the Acceleration of the Universe." *The Astrophysical Journal*, 2006, **644**, 1–20.

2. M. Sullivan, D. A. Howell, K. Perrett, P. E. Nugent, P. Astier, E. Aubourg, D. Balam, S. Basa, R. G. Carlberg, A. Conley, S. Fabbro, D. Fouchez, J. Guy, I. Hook, H. Lafoux, J. D. Neill, R. Pain, N. Palanque-Delabrouille, C. J. Pritchet, N. Regnault, J. Rich, R. Taillet, G. Aldering, S. Baumont, J. Bronder, M. Filiol, R. A. Knop, S. Perlmutter, C. Tao, "Photometric Selection of High-Redshift Type Ia Supernova Candidates." *The Astronomical Journal*, 2006, **131**, 960–972.

3. D. A. Howell, M. Sullivan, K. Perrett, T. J. Bronder, I. M. Hook, P. Astier, E. Aubourg, D. Balam, S. Basa, R. G. Carlberg, S. Fabbro, D. Fouchez, J. Guy, H. Lafoux, J. D. Neill, R. Pain, N. Palanque-Delabrouille, C. J. Pritchet, N. Regnault, J. Rich, R. Taillet, R. A. Knop, R. G. McMahon, S. Perlmutter, N. A. Walton, " Gemini Spectroscopy of Supernovae from the Supernova Legacy Survey: Improving High-Redshift Supernova Selection and Classification." *The Astrophysical Journal*, 2005, **634**, 1190–1201.

4. I. M. Hook, D. A. Howell, G. Aldering, R. Amanullah, M. S. Burns, A. Conley, S. E. Deustua, R. Ellis, S. Fabbro, V. Fadeyev, G. Folatelli, G. Garavini, R. Gibbons, G. Goldhaber, A. Goobar, D. E. Groom, A. G. Kim, R. A. Knop, M. Kowalski, C. Lidman, S. Nobili, P. E. Nugent, R. Pain, C. R. Pennypacker, S. Perlmutter, P. Ruiz-Lapuente, G. Sainton, B. E. Schaefer, E. Smith, A. L. Spadafora, V. Stanishev, R. C. Thomas, N. A. Walton, L. Wang, W. M. Wood-Vasey, "Spectra of High-Redshift Type Ia Supernovae and a Comparison with Their Low-Redshift Counterparts." *The Astronomical Journal*, 2005, **130**, 2788–2803.

5. G. Garavini, G. Aldering, A. Amadon, R. Amanullah, P. Astier, C. Balland, G. Blanc, A. Conley, T. Dahln, S. E. Deustua, R. Ellis, S. Fabbro, V. Fadeyev, X. Fan, G. Folatelli, B. Frye, E. L. Gates, R. Gibbons, G. Goldhaber, B. Goldman, A. Goobar, D. E. Groom, J. Haissinski, D. Hardin, I. Hook, D. A. Howell, S. Kent, A. G. Kim, R. A. Knop, M. Kowalski, N. Kuznetsova, B. C. Lee, C. Lidman, J. Mendez, G. J. Miller, M. Moniez, M. Mouchet, A. Mouro, H. Newberg, S. Nobili, P. E. Nugent, R. Pain, O. Perdereau, S. Perlmutter, R. Quimby, N. Regnault, J. Rich, G. T. Richards, P. Ruiz-Lapuente, B. E. Schaefer, K. Schahmaneche, E. Smith, A. L. Spadafora, V. Stanishev, R. C. Thomas, N. A. Walton, L. Wang, W. M. Wood-Vasey, "Spectroscopic Observations and Analysis of the Unusual Type Ia SN 1999ac." *The Astronomical Journal*, 2005, **130**, 2278–2292.

6. S. Nobili, R. Amanullah, G. Garavini, A. Goobar, C. Lidman, V Stanishev, G. Aldering, P. Antilogus, P. Astier, M. S. Burns, A. Conley, S. E. Deustua, R. Ellis, S. Fabbro, V. Fadeyev, G. Folatelli, R. Gibbons, G. Goldhaber, D. E. Groom, I. Hook, D. A. Howell, A. G. Kim, R. A. Knop, P. E. Nugent, R. Pain, S. Perlmutter, R. Quimby, J. Raux, N. Regnault, P. Ruiz-Lapuente, G. Sainton, K. Schahmaneche, E. Smith, A. L. Spadafora, R. C. Thomas, L. Wang,

"Restframe I-band Hubble diagram for type Ia supernovae up to redshift $z \sim 0.5$." *Astronomy & Astrophysics*, 2005, **437**, 789–804.

7. C. Lidman, D. A. Howell, G. Folatelli, G. Garavini, S. Nobili, G. Aldering, R. Amanullah, P. Antilogus, P. Astier, G. Blanc, M. S. Burns, A. Conley, S. E. Deustua, M. Doi, R. Ellis, S. Fabbro, V. Fadeyev, R. Gibbons, G. Goldhaber, A. Goobar, D. E. Groom, I. Hook, N. Kashikawa, A. G. Kim, R. A. Knop, B. C. Lee, J. Mendez, T. Morokuma, K. Motohara, P. E. Nugent, R. Pain, S. Perlmutter, V. Prasad, R. Quimby, J. Raux, N. Regnault, P. Ruiz-Lapuente, G. Sainton, B. E. Schaefer, K. Schahmaneche, E. Smith, A. L. Spadafora, V. Stanishev, N. A. Walton, L. Wang, W. M. Wood-Vasey, and N. Yasuda, "Spectroscopic confirmation of high-redshift supernovae with the ESO VLT." *Astronomy & Astrophysics*, 2005, **430**, 843-851.

8. G. Garavini, G. Folateli, A. Goobar, S. Nobili, G. Aldering, A. Amadon, R. Amanullah, P. Astier, C. Balland, G. Blanc, M. S. Burns, A. Conley, T. Dahlén, S. E. Deustua, R. Ellis, S. Fabbro, X. Fan, B. Frye, E. L. Gates, R. Gibbons, G. Goldhaber, B. Goldman, D. E. Groom, J. Haissinki, D. Hardin, I. M. Hook, D. A. Howell, D. Kasen, S. Kent, A. G. Kim, R. A. Knop, B. C. Lee, C. Lidman, J. Mendez, G. J. Miller, M. Moniez, A. Mourão, H. Newberg, P. E. Nugent, R. Pain, O. Perdereau, S. Perlmutter, V. Prasad, R. Quimby, J. Raux, N. Regnault, J. Rich, G. T. Richards, P. Ruiz-Lapuente, G. Sainton, B. E. Schaefer, K. Schahmaneche, E. Smith, A. L. Spadafora, V. Stanishev, N. A. Walton, L. Wang, and W. M. Wood-Vasey, "Spectroscopic Observations and Analysis of the Peculiar SN 1999aa." *The Astronomical Journal*, 2004, **128**, 387–404.

9. R. A. Knop, G. Aldering, R. Amanullah, P. Astier, G. Blanc, M. S. Burns, A. Conley, S. E. Deustua, M. Doi, R. Ellis, S. Fabbro, G. Folatelli, A. S. Fruchter, G. Garavini, S. Garmond, K. Garton, R. Gibbons, G. Goldhaber, A. Goobar, D. E. Groom, D. Hardin, I. Hook, D. A. Howell, A. G. Kim, B. C. Lee, C. Lidman, J. Mendez, S. Nobili, P. E. Nugent, R. Pain, N. Panagia, C. R. Pennypacker, S. Perlmutter, R. Quimby, J. Raux, N. Regnault, P. Ruiz-Lapuente, G. Sainton, B. Schaefer, K. Schahmaneche, E. Smith, A. L. Spadafora, V. Stanishev, M. Sullivan, N. A. Walton, L. Wang, W. M. Wood-Vasey, and N. Yasuda, "New Constraints on Ω_M and Ω_Λ, and w from an Independent Set of 11 High-Redshift Supernovae Observed with the Hubble Space Telescope." *The Astrophysical Journal*, 2003, **598**, 102–137.

10. S. Nobili, A. Goobar, R. A. Knop, and P. Nugent, "The intrinsic colour dispersion in Type Ia supernovae." *Astronomy & Astrophysics*, 2003, **404**, 901–912.

11. M. Sullivan, R. S. Ellis, G. Aldering, R. Amanullah, P. Astier, G. Blanc, M. S. Burns, A. Conley, S. E. Deustua, M. Doi, S. Fabbro, G. Folatelli, A. S. Fruchter, G. Garavini, R. Gibbons, G. Goldhaber, A. Goobar, D. E. Groom, D. Hardin, I. Hook, D. A. Howell, M. Irwin, A. G. Kim, R. A. Knop, C. Lidman, R. McMahon, J. Mendez, S. Nobili, P. E. Nugent, R. Pain, N. Panagia, C. R. Pennypacker, S. Perlmutter, R. Quimby, J. Raux, N. Regnault, P. Ruiz-Lapuente, B. Schaefer, K. Schahmaneche, A. L. Spadafora, N. A. Walton, L. Wang, W. M. Wood-Vasey, and N. Yasuda, "The Hubble diagram of type Ia supernovae as a function of host galaxy morphology." *Monthly Notices of the Royal Astronomical Society*, 2003, **340**, 1057–1075.

12. L.-G. Strolger, R. C. Smith, N. B. Suntzeff, M. M. Phillips, G. Aldering, P. Nugent, R. A. Knop, S. Perlmutter, R. A. Schommer, L. C. Ho, M. Hamuy, K. Krisciunas, L. M. Germany, R. Covarrubias, P. Candia, A. Athey, G. Blanc, A. Bonacic, T. Bowers, A. Conley, T. Dahlén,

W. Freedman, G. Galaz, E. Gates, G. Goldhaber, A. Goobar, D. Groom, I. M. Hook, R. Marzke, M. Mateo, P. McCarthy, J. Méndez, C. Muena, S. E. Persson, R. Quimby, M. Roth, P. Ruiz-Lapuente, J. Seguel, A. Szentgyorgyi, von K. Braun, W. M. Wood-Vasey, and T. York, "The Type Ia Supernova 1999aw: A Probable 1999aa-like Event in a Low-Luminosity Host Galaxy." *The Astronomical Journal*, 2002, **124**, 2905–2919.

13. R. Pain, S. Fabbro, M. Sullivan, R. S. Ellis, G. Aldering, P. Astier, S. E. Deustua, A. Fruchter, G. Goldhaber, A. Goobar, D. E. Groom, D. Hardin, I. M. Hook, D. A. Howell, M. J. Irwin, A. G. Kim, M. Y. Kim, R. A. Knop, J. C. Lee, C. Lidman, R. G. McMahon, P. E. Nugent, N. Panagia, C. R. Pennypacker, S. Perlmutter, P. Ruiz-Lapuente, K. Schahmaneche, B. Schaefer, and N. A. Walton, " The Distant Type Ia Supernova Rate." *The Astrophysical Journal*, 2002, **577**, 120–132.

14. L. G. Strolger, R. C. Smith, N. B. Suntzeff, M. M. Phillips, G. Aldering, P. Nugent, R. A. Knop, S. Perlmutter, R. A. Schommer, L. C. Ho, M. Hamuy, K. Krisciunas, L. M. Germany, R. Covarrubias, P. Candia, A. Athey, G. Blanc, A. Bonacic, T. Bowers, A. Conley, T. Dahlen, W. Freedman, G. Galaz, E. Gates, G. Goldhaber, A. Goobar, D. Groom, I. M. Hook, R. Marzke, M. Mateo, P. McCarthy, J. Mendez, C. Muena, S. E. Persson, R. Quimby, M. Roth, P. Ruiz-Lapuente, J. Seguel, A. Szentgyorgyi, K. von Braun, W. M. Wood-Vasey, and T. York, "The Ia supernova 1999aw: a probable 1999aa-like event in a low-luminosity host galaxy." *The Astronomical Journal*, 2002, **124**, 2905–2919.

15. G. Goldhaber, D. E. Groom, A. Kim, G. Aldering, P. Astier, A. Conley, S. E. Deustua, R. Ellis, S. Fabbro, A. S. Fruchter, A. Goobar, I. Hook, M. Irwin, M. Kim, R. A. Knop, C. Lidman, R. McMahon, P. E. Nugent, R. Pain, N. Panagia, C. R. Pennypacker, S. Perlmutter, P. Ruiz-Lapuente, B. Schaefer, N. A. Walton, and T. York, "Timescale Stretch Parametrization of Type Ia Supernova B-Band Light Curves", *The Astrophysical Journal*, 2001, **558**, 359–368

16. R. A. Knop, L. Armus, K. Matthews, T. W. Murphy, and B. T. Soifer, "Spatially Resolved Near-Infrared Spectroscopy of Seyfert 2 Galaxies Mk 1066, NGC 2110, NGC 4388, and Mk 3," *The Astronomical *Journal*, 2001, **122**, 764–791

17. J. A. Willick, K. L. Thompson, B. F. Mathiesen, S. Perlmutter, R. A. Knop, and G. J. Hill, "The Stanford Cluster Search: Scope, Method, and Preliminary Results." *Publications of the Astronomical Society of the Pacific*, 2001, **784**, 658–676.

18. G. Aldering, R. A. Knop, and P. E. Nugent, "The Rise-Times of High and Low Redshift Type Ia Supernovae Are Consistent," *The Astronomical Journal*, 2000, **192**, 2110–2117.

19. S. Perlmutter, G. Aldering, G. Goldhaber, R. A. Knop, P. E. Nugent, P. G. Castro, S. Deustua, S. Fabbro, A. Goobar, D. E. Groom, I. M. Hook, A. G. Kim, M. Y. Kim, J. C. Lee, N. J. Nunes, R. Pain, C. R. Pennypacker, R. Quimby, C. Lidman, R. S. Ellis, M. Irwin, R. G. McMahon, P. Ruiz-Lapuente, N. Walton, B. Schaefer, B. J. Boyle, A. V. Filippenko, T. Matheson, A. Fruchter, N. Panagia, H. J. M. Newberg, W. J. Couch, "Measurements of Ω_M and Ω_Λ from 42 High-Redshift Supernovae," *The Astrophysical Journal*, 1999, **517**, 565–586.

20. S. R. Bloom, S. G. Djorgovski, A. C. Eichelberger, P. Cote, J. P. Blakeslee, S. C. Odewahn, F. A. Harrison, D. A. Frail, A. V. Filippenko, D. C. Leonard, A. G. Riess, H. Spinrad, D. Stern, A. Bunker, A. Dey, B. Grossan, S. Perlmutter, R. A. Knop, I. M. Hook, and M. Feroci, " The unusual afterglow of the gamma-ray burst of 26 March 1998 as evidence for a supernova connection." *Nature*, 1999, **401**, 453–456.

21. S. Perlmutter, G. Aldering, M. Della Valle, S. Deustua, R. S. Ellis, S. Fabbro, A. Fruchter, G. Goldhaber, A. Goobar, D. E. Groom, I. M. Hook, A. G. Kim, M. Y. Kim, R. A. Knop, C. Lidman, R. G. McMahon, P. E. Nugent, R. Pain, N. Panagia, C. R. Pennypacker, P. Ruiz-Lapuente, B. Schaefer and N. Walton, "Discovery of a Supernova Explosion at Half the Age of the Universe and its Cosmological Implications," *Nature*, 1998, **391**, 51–54.

22. D. L. Shupe, J. E. Larkin, R. A. Knop, L. Armus, K. Matthews, and B. T. Soifer, "The Kinematics and Excitation of Molecular Hydrogen Emission in the Planetary Nebula BD +30°3639," *The Astrophysical Journal*, 1998, **498**, 267–277.

23. J. E. Larkin, L. Armus, R. A. Knop, B. T. Soifer, and K. Matthews, "A Near-Infrared Spectroscopic Survey of LINER Galaxies", *The Astrophysical Journal Supplement*, 1998, **114**, 59–72.

24. R. A. Knop, L. Armus, J. E. Larkin, K. Matthews, D. L. Shupe, and B. T. Soifer, "Infrared Spectroscopy of Paβ and [FeII] Emission in NGC 4151," *The Astronomical Journal*, 1996, **112**, 81–90.

25. J. E. Larkin, R. A. Knop, S. Lin, K. Matthews, and B. T. Soifer, "A Near Infrared Spectrograph for the Hale 5 Meter Telescope," *Publications of the Astronomical Society of the Pacific*, 1996, **108**, 211–217.

26. J. E. Larkin, L. Armus, R. A. Knop, K. Matthews, and B. T. Soifer, "Near-Infrared Spectroscopy of the ARP 220 Nuclei: Measuring the Nuclear Rotation," *The Astrophysical Journal*, 1995, **452**, 599–604.

27. M. S. Yun, N. Z. Scoville, and R. A. Knop, "VV114: Making of an Ultraluminous Galaxy?", *The Astrophysical Journal*, 1994, **430**, L109–L112.

28. R. A. Knop, B. T. Soifer, J. R. Graham, K. Matthews, D. B. Sanders, and N. Z. Scoville, "VV114, a High Infrared Luminosity Interacting Galaxy System," *The Astronomical Journal*, 1994, **107**, 920–929.

29. J. Pouliot, Y. Chan, D. E. DiGregorio, B. A. Harmon, R. A. Knop, C. Moisan, R. Roy, and R. G. Stokstad, "Excitation and Multiple Dissociation of ^{12}C, ^{14}N, and ^{16}O Projectiles in Peripheral Collisions at 32.5 MeV/Nucleon," *Physical Review C*, 1991, **43**, 735.

Contributed Articles and Chapters

- R. A. Knop, "Big Bang: a Terrible Name For a Great Theory," in Zikovic, Bora, ed., *The Open Laboratory: The Best Writing on Science Blogs 2006*, (c) 2007, Bora Zikovic.
- R. A. Knop, "Textbooks as Intellectual Activity? Supporting Textbooks Without Outlawing Used Books." *Astronomy Education Review*, 2006, vol. 5.

Invited Talks, Seminars, and Colloquiua

- "High-Velocity and Relativistic Gas Near the Supermassive Black Holes at the Cores of Galaxies":
  - East Carolina University, April, 2007.
  - The University of Missouri at Rolla, April, 2007.
  - Texas Tech, Lubbock, TX, March, 2007.
  - Western Kentucky University, February, 2007.
- "Galaxies in Collision", High Point University, March, 2006.
- "Measuring Cosmology with Type Ia Supernovae", Division of Particles and Fields, American Physical Society, UCLA, January, 1999.
- "Measuring the Expansion of the Universe with Supernovae", Harvey Mudd College, November, 1998.

Invited AAS Shapley Lectures

- "The Power of the Dark Side: The Exotic Material That Makes Up Most Of Our Universe", East Carolina University, April, 2007
- "The Power of the Dark Side: The Exotic Material That Makes Up Most Of Our Universe", Univ. of Missouri at Rolla, April, 2007
- "A Modern View of the Expanding Universe", Texas Tech, March, 2007
- "Galaxies in Collision", Westfield State College, May, 2006.
- "A Modern View of the Expanding Universe", Guilford Technical Community College, March, 2006.

Selected Contributed Talks and Presentations

- K. M. Chynoweth, R. A. Knop, & R. A. Gibbons, "An Optical Datacube of Seyfert/Starburst Composite Galaxy NGC1365," the American Astronomical Society, January, 2007 (BAAS 209.217.06)
- R. A. Knop, K. M. Chynoweth, R. A. Gibbons, N. Mahmud, & J. Stricker, "Optical Datacubes of Luminous Infrared Galaxies NGC 7130 and VV 114," the American Astronomical Society, January, 2006.
- R. A. Knop, "Three-Dimensional Animations for Introductory Astronomy," the American Astronomical Society, January, 2005 (BAAS 205.9507)
- R. A. Gibbons, R. A. Knop, N. Kuznetsova, & the Supernova Cosmology Project, "Supernovae at $z > 1.2$ Discovered with ACS on HST"

- R. A. Knop, "Application of Active Learning Techniques to an Advanced Course," the American Astronomical Society, June, 2004 (BAAS 204.2602)
- J. A. Schlaerth, R. A. Knop, & the Supernova Cosmology Project, "High Redshift Type Ia Supernova Lightcurves," the American Astronomical Society, June, 2004 (BAAS 204.6316) (J. Schlaerth was a senior undergraduate advisee of Robert Knop)
- E. Smith, *et al.*, "Optical Spectroscopy of High-Redshift Supernovae Used in Determination of Cosmological Parameters," the American Astronomical Society, January, 2004 (BAAS 203.4505) (E. Smith is a graduate student advisee of Robert Knop)
- R.A. Knop, *et al.*, "A New High-Redshift SN Ia Dataset that Addresses Extinction Questions in Cosmology Measurements," the American Astronomical Society, May, 2003 (BAAS 202.5403)
- R.A. Knop, *et al.*, "Measurements of the Cosmological Parameters Omega and Lambda from High-Redshift Supernova", the American Astronomical Society, January, 1997 (BAAS 191.8504). (This was the SCP's first public announcement of the results that ruled out the flat, matter-dominated universe and indicated the existence of a cosmological constant.)

Recent and Selected Outreach Activities

- Presentation on the expanding Universe to over 700 high school students over four different sessions to three different schools in and near Greenville, NC, April, 2007.
- "Why 'Was Einstein Wrong?' Is the Wrong Question", the Tennessee Spring Star Party, March, 2007.
- Leader, workshop on "active learning" techniques for introductory astronomy, High Point University, March, 2006.
- "Supermassive Black Holes at the Cores of Galaxies", the Tennessee Spring Star Party, March, 2006.
- Public-outreach lecture to the Atlanta Astronomy Club on interacting galaxies, May, 2006.
- Public-outreach lecture at Hypericon II (science-fiction convention in Nashville, TN), "Black Holes: Misconceptions, and the Even More Startling Truth", June, 2006.
- Public-outreach lecture at Hypericon II (science-fiction convention in Nashville, TN), "A Modern View of the Expanding Universe", June, 2006.
- A three-part podcast on the expansion of the Universe as part of Dyer Observatory's "Stellar Conversations" (`http://www.vanderbilt.edu/news/stellar_conversations?archive_month=&archive_year=2006&archives=Go`), Spring, 2006.
- Talks at Dyer Observatory public nights (2003-2006).
- Talk to the Tennessee Spring Star Party on March 12, 2005: "Interacting Galaxies, the Evolution of Galaxies, the Formation of the Elements, and How All of it Is Necessary for You"
- Featured talk at the Dyer Observatory 50th Anniversary Celebration, December 12, 2003: "From Seyfert Galaxies to the Expansion of the Universe."