

Curriculum Vitae of Nicholas Elias

PERSONAL:

Date of Birth: May 14, 1962
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EDUCATION:

- 1990 Ph.D., Astronomy and Astrophysics
Department of Astronomy and Astrophysics, University of Pennsylvania
Thesis: *Elliptical Polarimetry of the Eclipsing "Serpentid" Binary Stars SX Cassiopeiae and V367 Cygni*
Advisor: Dr. R.H. Koch
Funder: Zaccheus Daniel Fellowship, 1987-1990
- 1989 M.S., Astronomy and Astrophysics
Department of Astronomy and Astrophysics, University of Pennsylvania
- 1985 B.S.E.E. *magna cum laude*, Electrical Engineering; Astronomy minor
Department of Electrical and Computer Engineering, Lehigh University
- 1984 B.A. *magna cum laude*, Physics; Russian minor
Department of Physics, Lehigh University

ACADEMIC HONORS:

- 1985 Elizabeth Major Nevius Award
Electrical engineering major judged most outstanding
- 1984 Joseph C. Gabduza Jr. Prize
Junior electrical engineering major showing outstanding promise both intellectually and in leadership
- 1983 Phi Beta Kappa
National honor society, liberal arts and sciences
- 1983 Eta Kappa Nu
National honor society, electrical engineering
- 1983 Tau Beta Pi
National honor society, science and engineering

EMPLOYMENT:

- 09/2009-present Associate Astronomer, CASA Software Supervisor
National Radio Astronomy Observatory, Socorro NM
EVLA and ALMA radio telescope programs
- 07/2006-08/2009 Visiting Astronomer, Software Lead, Science Team Member
Universität Heidelberg & MPIA; Heidelberg, Germany
Phase-Referenced Imaging & Microarcsecond Astrometry program
- 12/2004-05/2006 Astronomer and Senior Systems Engineer
Ball Aerospace & Technologies Corp.; Boulder, CO
Ozone Mapping and Profiler Suite program
- 11/2002-12/2004 Astronomer and Senior Systems Engineer
Ball Aerospace & Technologies Corp.; Boulder, CO
Terrestrial Planet Finder, new business division
- 06/1997-11/2002 Astronomer GS-13
United States Naval Observatory; Flagstaff, AZ
Navy Prototype Optical Interferometer

09/1990-06/1997 Astronomer GS-12
United States Naval Observatory; Washington, DC
USNO/NRL Optical Interferometer Project

PROFESSIONAL MEMBERSHIPS:

2009-present International Astronomical Union (Commission 54, pending)

2008-2009 Blue Dot Team

1997-present International Astronomical Union (Commission 42)

1988-present American Astronomical Society

ACCOMPLISHMENTS:

- I am presently the supervisor for the *CASA* data-reduction software package, which will be used to process data from the VLA (Socorro, NM) and ALMA (Atacama, Chile) radio telescopes. The team consists of approximately 15 FTE in four groups (ESO/Garching, NRAC/Charlottesville, NRAO/Socorro, NAOJ/Tokyo). I have produced a roadmap document, and I am in the process of reorganizing the group to work more efficiently.
- I was a science team member of the Phase-Referenced Imaging and Microarcsecond Astrometry (PRIMA) program at the Universität Heidelberg, Landessternwarte and Max-Planck-Institut für Astronomie. I was also the lead for the astrometric data-reduction software (ADRS). My team consisted of three to five people at any given time. When I joined the project, some good design work had already been done, but it was somewhat disorganized and complicated. I simplified and reorganized the design, and we then passed FDR and PAE. We continually tested and updated the code, and we were ready for commissioning in 2009/2010.
- I mentored a PhD student, Ronny Geisler, on an SPIE paper concerning the removal of cyclic phase errors in PRIMA. I derived the required mathematics, while Ronny wrote a simulator to verify the mathematics and test performance versus different noise sources. This simulator is being used to test the ADRS.

- Robert Koch, Raymond Pfeiffer, and I published a paper in *Astronomy & Astrophysics* containing unreduced optical polarimetry from the Flower and Cook Observatory (FCO). The sources included mass-transferring binary stars and β Cepheid non-radial pulsators. We found evidence for periodic and long-term polarization behavior in some binary stars, and a tentative correlation between pulsational period and polarization for γ Pegasi. Also, we found a tight linear correlation between the average polarization of the β Cepheids and extinction, which could be used to constrain models of interstellar dust grains.
- I acted as an auxiliary mentor for Frances Mackay, an MS student at the University of Western Ontario. She used software developed by her advisor, Carol Jones, to model Be stars observed via optical interferometric polarimetry (OIP). I provided the initial OIP mathematics and subsequent advice. Frances' thesis is finished and will appear in a refereed journal (I am a coauthor).
- I am leading a small OIP group. We have written a white paper on OIP science and technical challenges. I am maintaining an OIP web site (<http://www.lsw.uni-heidelberg.de/users/nelias/OIP.html>), which includes an extensive bibliography. At present: 1) I am responsible for the systems engineering of our instrument, including calibration simulations; 2) Carol Jones is responsible for OIP Be star modeling software; 3) Anders Jorgensen is responsible for coherent averaging simulations; and 4) Henrique Schmitt is responsible for various technical and logistical issues.
- I developed calculi for observing photon *orbital* angular momentum (POAM, also called vortices) with astronomical telescopes, including Michelson interferometers and coronagraphs. I also showed how POAM can be used for super-Rayleigh modeling of simple unresolved sources. This work has been accepted by *Astronomy & Astrophysics*. I am in the process of writing a follow-up paper on POAM applications in astronomy.
- I was a member of the Terrestrial Planet Finder Interferometer (TPF-I) architecture team, sponsored by JPL. I was the lead for the Ball Aerospace contingent of the Planet Signal Extraction Working Group (PSEWG). I mentored a recent PhD recipient, David Draper, and together we developed matrix-based algorithms and metrics for planetary imaging with the TPF-I. Our paper has been published in the *Astronomical Journal*. We determined that a fixed-boom architecture may not provide enough information for extra-solar planet image reconstruction.

- As a member of the TPF-I architecture team, I participated in numerous discussions on topics such as target stars and observing strategy. I also dealt with polarization issues. It turns out that polarization mismatches between the arms can destroy the null if they are not compensated. I have written papers on this subject in SPIE Proceedings.
- I was a contributor to Martin Harwit's study report for the Submillimeter Probe of the Evolution of Cosmic Structure (SPECS) mission. As a result of this work, a seminal paper on the mathematics (including polarization calculi) of wide-angle high spatial/spectral resolution Double-Fourier interferometers has appeared in the Astrophysical Journal.
- I led a multi-wavelength and multi-mode campaign on the mass-transferring binary star AX Monocerotis. We provided conclusive proof of a disk-impact region orbiting the hot component. We published a detailed paper about this object in the Astrophysical Journal.
- I was part of the team that resolved Nova Cygni 1992 in H α with the Mark III optical interferometer only three days after the explosion. At the present time, no other group can make this claim. We were able to estimate its distance from the expansion rate. We published a paper about our observations in the Astronomical Journal.
- I led a multi-wavelength and multi-mode campaign on the chromospherically active binary star UX Arietis. Using optical and radio light curves, we showed that the radio emission was emitted directly above the spotted regions. We published a detailed paper about this object in the Astrophysical Journal.
- I was the first to place polarization effects in Michelson optical interferometers on a firm mathematical footing. I employed the same mathematics to explain self-interference in laser-metrology interferometers. I also developed observables for performing polarimetry with atmospherically limited Michelson interferometers. I have published several papers on this subject in the Astrophysical Journal and SPIE Proceedings. The page charges for one of them were paid from an AAS small research grant (\$2000).

- I developed polarization mathematics for the Terrestrial Planet Finder Coronagraph (TPF-C). I led a team (and mentored a young optical engineer) that produced preliminary simulations of simple coronagraphs. We found significant polarization aberrations at low spatial frequencies. We published a paper on this subject in SPIE Proceedings.
- I was an instrument analyst for the Ozone Mapping and Profiler Suite (OMPS). I developed software and algorithms, in the IDL language, to analyze engineering data from the instrument.
- I developed algorithms and an extensive software package for the laser-metrology system of the Navy Prototype Optical Interferometer (NPOI). I was also part of the team that maintained the metrology optics.
- I was part of the team that obtained 10-15 mas wide-angle differential astrometry using the Mark III optical interferometer. We published a paper on this subject in the *Astronomical Journal*.
- I was the first to detect radio emission from peculiar emission-line Algol stars with the VLA. The radio spectra indicated extensive electron-scattering envelopes. I published this work in the *Astrophysical Journal*.
- I obtained long-term polarization observations for the mass-transferring binary stars SX Cassiopeiae and V367 Cygni. I was able to place upper limits on the size of the electron-scattering envelope of the former. This work appeared in my PhD thesis, and the V367 Cygni observations appeared in a journal article.

JOURNAL ARTICLES AND CONFERENCE PROCEEDINGS:

60 *Astronomical Applications for Photon Orbital Angular Momentum*, **Elias II, N.M.**, 2010, *in preparation*.

59 *Calibration of Optical Interferometers Used for Polarimetry*, **Elias II, N.M.**, 2010, *in preparation*.

58 *Using Optical Interferometric Polarimetry to Place Constraints on the Disks Surrounding Be Stars*, Mackay, F.E., **Elias II, N.M.**, Jones, C.E., and Sigut, T.A.A., 2009, *ApJ* **704**, 591.

57 *Photon Orbital Angular Momentum in Astronomy*, **Elias II, N.M.**, 2008, *A&A* **492**, 893.

56 *Polarimetric Measures of Selected Variable Stars*, **Elias II, N.M.**, Koch, R.H., and Pfeiffer, R.J. 2008, *A&A* **489**, 911.

55 *The Astrometric Data-Reduction Software for Exoplanet Detection with PRIMA*, **Elias II, N.M.**, Köhler, R., Stiliz, I., Reffert, S., Geisler, R., Quirrenbach, A., de Jong, Jeroen, Delplancke, F., Tubbs, R.N., Launhardt, R., Henning, Th., Mégevand, D., and Queloz, D., 2008, *SPIE* **7013**, 128.

54 *Simulations of Imperfect PRIMA Fringe Sensing Units and Calibration Strategies*, Geisler, R., **Elias II, N.M.**, Quirrenbach, A., Köhler, R., Tubbs, R.N., Henning, Th., and Queloz, D., 2008, *SPIE* **7013**, 76.

53 *The ESPRI project: Differential Delay Lines for PRIMA*, Pepe, F., Queloz, D., Henning, Th., Quirrenbach, A., Delplancke, F., Andolfato, L., Baumeister, H., Bizenberger, P., Bleulere, H., Chazelas, B., Déried, F., Di Lietod, L., Duc, T.P., Duvanel, O., **Elias II, N.M.**, Fleury, M., Geisler, R., Gillet, D., Graser, U., Koch, F., Köhler, R., Launhardt, R., Maire, C., Mégevand, D., Michellod, Y., Moresmaud, J.-M., Müllhaupt, P., Naranjo, V., Reffert, S., Sache, L., Ségransan, D., Salvadé, Y., Setiawan, J., Simond, G., Sosnowska, D., Stiliz, I., Tubbs, R.N., Wagner, K., Weber, L., and Zagoi, L., 2008, *SPIE* **7013**, 76.

52 *The Astrometric Data Reduction Software (ADRS) and Error Budget for PRIMA*, **Elias II, N.M.**, Tubbs, R.N., Köhler, R., Reffert, S., Stiliz, I., Launhardt, R., de Jong, J., Quirrenbach, A., Delplancke, F., Henning, Th., Queloz, D., and ESPRI Consortium 2008, *IAUS* **249**, 119.

51 *The ESPRI Project: Narrow-Angle Astrometry with VLTI-PRIMA*, Launhardt, R., Henning, Th., Queloz, D., Quirrenbach, A., Delplancke, F., **Elias II, N.M.**, Pepe, F., Reffert, S., Ségransan, D., Setiawan, J., Tubbs, R.N., and the ESPRI Consortium, 2008, *IAUS* **248**, 417.

50 *ESPRI Data-Reduction Strategy and Error Budget for PRIMA*, Tubbs, R.N., **Elias**

II, N.M., Launhardt, R., Reffert, S., Delplancke, F., Quirrenbach, A., Henning, Th., Queloz, D., and ESPRI Consortium 2008, *IAUS* **248**, 132.

49 *A Kilometer-Baseline Far-Infrared/Submillimeter Interferometer in Space*, Harwit, M., Leisawitz, D., Rinehart, S., Benford, D., Budinoff, J., Chalmers, R., Cottingham, C., Danchi, W., DiPirro, M.J., Farley, R., Hyde, T.T., Jones, A.L., Kuchner, M.J., Liu, A., Lyon, R., Mather, J.C., Marx, C.T., Martino, A.J., Moseley, S.H., Ollendorf, S., Quinn, D.A., Silverberg, R.F., Whitehouse, P., Wilson, M., Pearson, J.C., Lawrence, C., Serabyn, E., Shao, M., Smythe, R., Yorke, H.W., Mundy, L.G., Lorenzini, E., Bombardelli, C., Allen, R.J., Calcetti, D., Blain, A., Doggett, W., Labeyrie, A., Nakagawa, T., Neufeld, D.A., Satyapal, S., Stacey, G., Wright, E.L., **Elias II, N.M.**, Fischer, D., Leitch, J., Noecker, M.C., Espero, T., Friedman, E.J., Woodruff, R.A., and Lille, C., 2008, in *NASA Space Vision Missions*, ed. Marc S. Allen, *Progress in Aeronautics and Astronautics* **224**, 301.

48 *The PRIMA Astrometric Data Reduction Software*, de Jong, J.A., Delplancke, F., Palsa, R., Ballester, P., Quirrenbach, A., **Elias, N.**, Reffert, S., Köhler, R., Launhardt, R., Tubbs, R., Stiltz, I., Henning, T., Mégevand, D., Pepe, F., Queloz, D., 2007, *ASPC*, **376**, 289.

47 *The Mathematics of Double-Fourier Interferometers*, **Elias II, N.M.**, Harwit, M., Leisawitz, D., and Rinehart, S.A., 2007, *ApJ* **657**, 1178.

46 *Planet Signal Extraction for the Terrestrial Planet Finder Interferometer*, Draper, D.W., **Elias II, N.M.**, Noecker, M.C., Dumont, P.J., Lay, O.P., and Ware, B., 2006, *AJ* **131**, 1822.

45 *Update on TPF Coronagraph Polarization*, M.C. Noecker, R. Bates, **Elias II, N.M.**, Turner-Valle, J., 2005, *SPIE* **5905**, 352.

44 *Polarization Analysis for Terrestrial Planet Finder Coronagraph Designs*, **Elias II, N.M.**, Bates, R., Turner-Valle, J., 2004, *SPIE* **5555**, 248.

43 (Invited) *Polarization and Planet-Detecting Nulling Interferometers*, **Elias II, N.M.**, Draper, D.W., Noecker, M.C., 2004, *SPIE* **5555**, 215.

42 *Significant Science Projects with Simple Sources Using an Optical Interferometer and Polarimeter*, **Elias II, N.M.**, 2004, *SPIE*, **5432**, 175.

41 *Optical Interferometric Polarimetry II. Theory*, **Elias II, N.M.**, 2004, *ApJ* **611**, 1175.

40 *Angular Diameters of Stars from the Mark III Optical Interferometer*, Mozurkewich, D., Armstrong, J.T., Hindsley, R.B., Quirrenbach, A., Hummel, C.A., Hutter, D.J., Johnston, K.J., Hajian, A.R., **Elias II, N.M.**, Buscher, D.F., and Simon, R.S., 2003, *AJ* **126**, 2502.

39 *TPF Interferometer Planet Detection Sensitivity*, **Elias II, N.M.** and Noecker, M.C., 2003, *SPIE* **5170**, 95.

38 *Modeling Polarization Effects in Nulling Interferometers*, **Elias II, N.M.**, 2003, *SPIE* **5170**, 91.

37 *Optical Interferometric Polarimetry*, **Elias II, N.M.**, 2003, *SPIE* **4843**, 137.

36 *Array Metrology System for an Optical Long-Baseline Interferometer*, Hutter, D.J. and **Elias II, N.M.**, 2003, *SPIE* **4838**, 1234.

35 *Optical Interferometric Polarimetry I. Foundation*, **Elias II, N.M.**, 2001, *ApJ* **549**, 647.

34 *Photospheric Spots and a Chromospheric Plage on V523 Cassiopeiae*, **Elias II, N.M.** and Koch, R.H., 2001, *AJ* **120**, 1548.

33 *ζ Orionis A is a Double Star*, Hummel, C.A., White, N.M., **Elias II, N.M.**, Hajian, A.R., and Nordgren, T.E., 2000, *ApJL* **540**, L91.

32 *Stellar Angular Diameters of Late-Type Giants and Supergiants Measured with the Navy Prototype Optical Interferometer*, Nordgren, T.E., Germain, M.E., Benson, J.A., Mozurkewich, D., Sudol, J.J., **Elias II, N.M.**, Hajian, A.R., White, N.M., Hutter, D.J., Johnston, K.J., Gauss, F.S., Armstrong, J.T., Pauls, T.A., and Rickard, L.J., 1999, *AJ* **118**, 3032.

31 *NPOI Observations of Double Stars Mizar A and Matar*, Hummel, C.A., Mozurkewich, D., Armstrong, J.T., Benson, J.A., Hajian, A.R., **Elias II, N.M.**, and Hutter, D.J., 1998, *AJ* **116**, 2536.

30 *The Navy Prototype Optical Interferometer*, Armstrong, J.T., Mozurkewich, D., Rickard, L.J., Hutter, D.J., Benson, J.A., Bowers, P.F., **Elias II, N.M.**, Johnston, K.J., Buscher, D.F., Clark III, J.H., Ha, L., Hummel, C.A., Ling, L.C., White, N.M., and Simon, R.S., 1998, *ApJ* **496**, 550.

29 *Direct Confirmation of Stellar Limb Darkening with the Navy Prototype Optical Interferometer*, Hajian, A.R., Armstrong, J.T., Hummel, C.A., Benson, J.A., Mozurkewich, D., Pauls, T.A., Hutter, D.J., **Elias II, N.M.**, Johnston, K.J., Rickard, L.J., and White, N.M., 1998, *ApJ* **496**, 484.

28 *First Astrometric Results from the NPOI*, Hutter, D.J., **Elias II, N.M.**, and Hummel, C.A., 1998, *SPIE* **3350**, 452.

27 *Single-star Masses via Fourier Transform Spectroscopy*, Hajian, A.R. and **Elias II, N.M.**, 1998, *IAUS* **189**, 60.

26 *Astrometry Using Interferometry at Optical Wavelengths*, Johnston, K.J., Hutter, D.J., Benson, J.A., **Elias II, N.M.**, Armstrong, J.T., Mozurkewich, D., Pauls, T.A., and Hummel, C.A., 1998, *IAUS* **189**, 39.

25 *Seeing Tests at Four Sites in Support of the NPOI Project*, Hutter, D.J., **Elias II, N.M.**, Peterson, E.J., Weaver, W.B., Weaver, G., Mozurkewich, D., Vrba, F.J., Buscher, D.F., and Hummel, C.A., 1997, *AJ* **114**, 2822.

24 *Multichannel Optical Synthesis Imaging of ζ^1 Ursae Majoris with the Navy Prototype Optical Interferometer*, Benson, J.A., Hutter, D.J., **Elias II, N.M.**, Bowers, P.F., Johnston, K.J., Hajian, A.R., Mozurkewich, D., Armstrong, J.T., Pauls, T.A., Rickard, L.J., Hummel, C.A., White, N.M., Black, D., and Denison, C.S., 1997, *AJ* **114**, 1221.

23 *Constraints on the Geometry of Circumstellar Envelopes: Optical Interferometric and Spectropolarimetric Observations of Be Stars*, Quirrenbach, A., Bjorkman, K.S., Bjorkman, J.E., Hummel, C.A., Buscher, D.F., Armstrong, J.T., Mozurkewich, D., **Elias II, N.M.**, and Babler, B.L., 1997, *ApJ* **479**, 477.

22 *New Perspectives on AX Monocerotis*, **Elias II, N.M.**, Wilson, R.E., Olson, E.C.,

Aufdenberg, J.P., Guinan, E.F., Güdel, M., Van Hamme, W.V., and Stevens, H.L., 1997, *ApJ* **484**, 394.

21 *Tcl- and [Incr tcl]- Based Applications for Astronomy and the Sciences*, **Elias II, N.M.**, 1997, *ASPCS* **125**, 124.

20 *A Radio Survey of Peculiar Emission-Line Algols*, Güdel, M. and **Elias II, N.M.**, 1996, *ASPS* **93**, 312.

19 *The Corona of the ZAMS Solar Twin EK Dra*, Güdel, M., Schmidt, J.H.M.M., Benz, A.O., and **Elias II, N.M.**, 1995, *A&A* **301**, 201.

18 *Correlations between the Flaring Radio Emission and Starspot Distribution of UX Arietis*, **Elias II, N.M.**, Quirrenbach, A., Witzel, A., Naundorf, C.E., Wegner, R., Guinan, E.F., and McCook, G.P., 1995, *ApJ* **439**, 983.

17 *Four Years of Astrometric Measurements with the Mark III Optical Interferometer*, Hummel, C.A., Mozurkewich, D., **Elias II, N.M.**, Quirrenbach, A., Buscher, D.F., Armstrong, J.T., Johnston, K.J., Simon, R.S., and Hutter, D.J., 1994, *AJ* **108**, 326.

16 *Very High Precision Orbit of Capella by Long-Baseline Interferometry*, Hummel, C.A., Armstrong, J.T., Quirrenbach, D.F., Buscher, D.F., Mozurkewich, D., **Elias II, N.M.**, and Wilson, R.E., 1994, *AJ* **107**, 1859.

15 *Baseline Metrology System of the USNO Astrometric Interferometer*, **Elias II, N.M.**, 1994, *SPIE* **2200**, 71.

14 *Observations of Nova Cygni 1992 with a Long-Baseline Optical Interferometer*, Quirrenbach, A., **Elias II, N.M.**, Mozurkewich, D., Armstrong, J.T., Buscher, D.F., and Hummel, C.A., 1993, *AJ* **106**, 1118.

13 *Radio Observations of Peculiar Emission-Line Algol Binary Stars*, **Elias II, N.M.** and Güdel, M., 1993, *AJ* **106**, 337.

12 *Elliptical Polarimetry of the Interacting Binary Star V367 Cygni*, **Elias II, N.M.**, 1993, *ApJ* **410**, 785.

11 *UBVRI Linear and Circular Polarization of RS CVn-Type Binaries*, Scaltriti, F., Piirola, V., Coyne, G.V., Koch, R.H., **Elias II, N.M.**, and Holenstein, B.D., 1993, *A&AS* **102**, 343.

10 *The Asymmetric Envelope of Gamma Cassiopeiae Observed with the MkIII Optical Interferometer*, Quirrenbach, A., Hummel, C.A., Buscher, D.F., Armstrong, J.T., Mozurkewich, D., and **Elias II, N.M.**, 1993, *ApJL* **416**, L25.

09 *The Baseline Metrology System of the USNO Astrometric Interferometer*, **Elias II, N.M.** and Hutter, D.J., 1993, *IAUS* **158**, 174.

08 *UBVRI Linear and Circular Polarization of RS Canum Venaticorum Stars*, Scaltriti, F., Piirola, V., Coyne, G.V., Koch, R.H., **Elias II, N.M.**, Holenstein, B. D., 1993, *A&AS* **102**, 343.

07 *The Differential Extinction toward Nova Cygni 1992*, **Elias II, N.M.**, 1993, *IBVS* #3860.

06 *Discovery of Two Radio Galaxies in the Zwicky Cluster 1437.3+6436*, **Elias II, N.M.** and Struble, M.F., 1991, *AJ* **102**, 30.

05 *Detection of Variable Elliptical Polarization of HD 129333*, **Elias II, N.M.** and Dorren, J.D., 1990, *AJ* **100**, 818.

04 *Centimeter Observations of Six Eclipsing "Serpentid" Binary Stars*, **Elias II, N.M.**, 1990, *ApJ* **352**, 300.

03 *Optical Elliptical Polarimetry and Centimeter Flux Observations of the Very Active Solar-Type Star HD 129333*, **Elias II, N.M.** and Dorren, J.D., 1990, *IBVS* #3541.

02 *Polarimetric Observations of Active Cool Binaries*, Coyne, G.V., **Elias II, N.M.**, Holenstein, B.D., Koch, R.H., Piirola, V., and Scaltriti, F., 1990, *IAUS* **130**, 225.

01 *Polarizing Gas at Small Optical Depths Around Algols*, Koch, R.H., **Elias II, N.M.**, Corcoran, M., and Holenstein, B.D., 1989, *SpSciRev* **50**, 63.

TEXTBOOK & WHITEPAPER PUBLICATIONS:

08 *Detecting and Characterizing Extrasolar Planetary Systems with Astrometry: Review from the Blue Dots Astrometry Working Group*, Malbet, F., Sozzetti, A.,

Lazorenko, P., Launhardt, R., Segransan, D., Delplancke, F., **Elias, N.**, Muterspaugh, M., Quirrenbach, A., Reffert, S., van Belle, G., 2009, arXiv:0912.0400.

07 *The Case for Optical Interferometric Polarimetry*, **Elias II, N.M.**, Jones, C.E., Schmitt, H.R., Jorgensen, A.M., 2008, *BAAS* **41**, 431.

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LANGUAGES:

- German (very elementary)
- Russian (elementary reading with dictionary)
- Modern Greek (elementary reading with dictionary, elementary speaking)
- International Morse Code (25/35 words per minute by hand/ear)

COMPUTER LANGUAGES:

- ANSI C, C++, FORTRAN/77 (advanced knowledge)
- IDL (advanced knowledge)
- Tcl (advanced knowledge, including extensions Tk and [Incr Tcl])
- Python (moderate knowledge)
- Glish (moderate knowledge)
- MATLAB (elementary knowledge)

OTHER INTERESTS:

Amateur radio:

- antenna design and installation
- HF propagation prediction
- DXing and contesting, especially with Morse code
- digital modes

Dancing:

- rhythm two-step
- east-coast swing
- west-coast swing
- polka
- cowboy cha-cha