Henry Ngo

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Last academic affiliation:
National Research Council of Canada
Herzberg Astronomy & Astrophysics

henry@planetngo.ca
http://www.planetngo.ca

appointments

2017 – 2020	**Plaskett Fellow**, NRC Herzberg Astronomy & Astrophysics
2012 – 2017	**Graduate Research Assistant**, California Institute of Technology
2010 – 2012	**Graduate Research Assistant**, Queen's University
2007 – 2010	**Undergraduate Research Assistant**, University of British Columbia

· Including two full-time co-op work placements (2008-2009)

education

2017	**PhD, Planetary Sciences**, California Institute of Technology

· Thesis: Formation and migration histories of giant exoplanets in multi-stellar systems
· Advisor: Prof. Heather A. Knutson
· MS, Planetary Sciences, 2014

2012	**MSc, Astronomy**, Queen's University at Kingston, Ontario

· Thesis: Numerical Simulations of Giant Planetary Core Formation
· Advisor: Prof. Martin J. Duncan

2010	**BSc (Hons), Physics & Astronomy**, University of British Columbia

· with 16 months of full-time co-op work placements
· Thesis: Pointing Strategy for Observation of Near Earth Objects with NEOSSat
· Advisor: Prof. Brett J. Gladman

awards

2015 – 2017	**NASA Fellowship (NESSF)**, California Institute of Technology
2012 – 2015	**NSERC PGS (Doctoral level)**, California Institute of Technology

· Declined the CGS-D to take the PGS-D outside of Canada

2011 – 2012	**Ontario Graduate Scholarship**, Queen's University
2010 – 2011	**NSERC CGS (Masters level)**, Queen's University
2010 – 2011	**Robert Sutherland Fellowship**, Queen's University
2008	**NSERC USRA (Undergraduate level)**, University of British Columbia
2007	**Trek Excellence Scholarship**, University of British Columbia
2005	**President's Entrance Scholarship**, University of British Columbia
2005	**Governor General's Academic Medal (Bronze)**

observing experience and awarded programs

Classical	Keck (51 nights), Subaru (4 nights), Palomar (1 night)
Queue (PI)	Gemini Band 1 (11.5 hrs), Gemini Band 3 (5.5 hrs)

student supervision

2018 – 2020	Advisor for Michelle Kunimoto's observing project (UBC PhD student)
2018	Co-supervisor for Nathaniel Comeau (co-op student from U. Victoria)
2017	Co-supervisor for Wenhao Xuan (Pomona College undergraduate)
2015	Co-supervisor for Paige Gannon (Caltech undergraduate)

teaching

2019	**Instructor**, Bayesian inference and MCMC Workshop at UVic Astronomy
2018 – 2019	**Guest Instructor**, UVic Introduction to Planetary Science Course
2015 – 2016	**TA training organizer**, California Institute of Technology
2014 – 2016	**Teaching Assistant**, California Institute of Technology
2010 – 2011	**Teaching Assistant**, Queen's University
2008 – 2010	**Civilian Instructor / Drill Team Coach**, 609 Air Cadet Squadron
2007 – 2010	**Alma Mater Society Tutoring Services**, University of British Columbia
2007 – 2008	**Undergraduate Teaching Assistant**, University of British Columbia
2005	**Staff Cadet Instructor**, Air Cadet Training Centre Albert Head

outreach

2018 – 2019	**Volunteer**, Science World Scientist & Innovators in Schools Program
2018 – 2019	**Volunteer**, Skype-a-Scientist
2017	**Volunteer instructor**, Huntington Library, Art Collection & Gardens
2016 – 2017	**Volunteer instructor**, Institute for Educational Advancement
2013 – 2014	**Volunteer judge**, Pasadena schools science fairs
2010 – 2012	**Volunteer**, Queen's University Observatory Public Outreach Program
2007	**Volunteer**, University of British Columbia Cedar Science Camp

professional activities

Peer review

- CanTAC External Reviewer (2016, 2017)
- Journal article review for ApJ, AJ, A&A (2016–2019)

Conference organization

- LOC: New Horizons in Planetary Systems, Victoria, BC, May 13-17, 2019
- SOC: Astronomy NWxSW Meeting, UBC, Nov 3-4, 2018
- LOC: Exoplanets in Southern California (ExSoCal), Caltech, Sep 22-23, 2016

Colloquium organization

- NRC Herzberg Astronomy Colloquium Series (2017–2019)
- Caltech Planetary Science Seminar (2014-2015)
- Caltech Planetary Paper Discussion Group (2014-2015)

service

2013 – 2017 **Board of Directors**, Caltech Graduate Student Council
2011 – 2012 **TA Union Department Steward**, Queen's University/PSAC 901
2008 – 2010 **Editor**, Canadian Undergraduate Physics Journal
2007 – 2010 **Physics Society Executive Council**, University of British Columbia

invited talks and seminars

"Imaging exoplanets"
- Boise State University Physics Seminar, May 3, 2019

"Imaging performance prediction with random forests"
- UVic ARCNet Seminar, March 14, 2019

"Exoplanet Imaging" (review talk)
- Astronomy NWxSW Meeting, UBC, November 4, 2018

"Giant planet archeology with near-infrared imagers"
- Dominion Radio Astrophysical Observatory Seminar, June 13, 2018

"Planet formation and migration in extreme planetary systems"
- University of British Columbia, Astronomy Colloquium, March 19, 2018

"Direct imaging searches for giant planets around small stars"
- NRC Herzberg, Astronomy Seminar, September 5, 2017

"Constraining warm and hot Jupiter dynamics with direct imaging surveys"
- Université de Montréal, Astronomy & Astrophysics seminar, December 1, 2016
- University of California, Santa Cruz lunch-time astrophysics seminar, November 7, 2016
- NASA Ames Center for Exoplanet studies seminar, October 13, 2016
- University of California Berkeley Center for Integrative Planetary Sciences seminar, October 12, 2016
- University of California, Los Angeles, September 29, 2016
- Las Cumbres Observatory Global Telescope science seminar, August 25, 2016

publications

*Peer-reviewed, first author or student-led (marked by *)*

[5] *Kunimoto, M., Matthews, J., **Ngo, H.** (2020), "Searching the entirety of Kepler Data. I. 17 new planet candidates including one habitable zone world." The Astronomical Journal, 159, 124.

[4] *Xuan, W. J., Mawet, D., **Ngo, H.**, Ruane, G., Bailey, V., Choquet, E., Absil, O., Alvarez, C., Bryan, M., Cook, T., Femenía Castellá, B., Gomez Gonzalez, C., Huby, E., Knutson, H., Matthews, K., Ragland, S., Serabyn, E., Zawol, Z. (2018), "Characterizing the performance of the NIRC2 Vortex Coronagraph at W. M. Keck Observatory." The Astronomical Journal, 156, 156.

[3] **Ngo, H.**, Knutson, H., Bryan, M., Blunt, S., Nielsen, E., Batygin, K., Bowler, B., Crepp, J., Hinkley, S., Howard, A., Mawet, D. (2017), "No difference in orbital parameters of RV-detected giant planets between 0.1-5 au in single vs multi-stellar systems." The Astronomical Journal, 153, 242.

[2] **Ngo, H.**, Knutson, H., Hinkley, S., Bryan, M., Crepp, J., Batygin, K., Crossfield, I., Hansen, B., Howard, A., Johnson, J., Mawet, D., Morton, T., Muirhead, P., Wang, J. (2016), "Friends of Hot Jupiters. IV. Stellar companions beyond 50 AU might facilitate giant planet formation, but most are unlikely to cause Kozai-Lidov migration." The Astrophysical Journal, 827, 8.

[1] **Ngo, H.**, Knutson, H., Hinkley, S., Crepp, J., Bechter, E., Batygin, K., Howard, A., Johnson, J., Morton, T., Muirhead, P. (2015), "Friends of Hot Jupiters II: No Correspondence Between Hot-Jupiter Spin-Orbit Misalignment and the Incidence of Directly Imaged Stellar Companions." The Astrophysical Journal, 800, 138.

Peer-reviewed, co-author

[28] Uyama, T., Ren, B., Mawet, D., Ruane, G., Bond, C., Hashimoto, J., Liu, M., Muto, T., Ruffio, J.-B., Wallack, N., Baranec, C., Bowler, B., Choquet, E., Chun, M., Delorme, J.-R., Fogarty, K., Guyon, O., Jensen-Clem, R., Meshkat, T., **Ngo, H.**, Wang, J., Wang, J., Wizinowich, P., Ygouf, M., Zuckerman, B. (2020) "Early high-contrast imaging results with Keck/NIRC2-PWFS: The SR 21 disk", The Astronomic Journal, 160, 283.

[27] Greenstreet, S., Gladman, B., **Ngo, H.** (2020) "Transient Jupiter co-orbitals from solar system sources." The Astronomical Journal, 160, 144.

[26] Wang, J., Ginzburg, S., Ren, B., Wallack, N., Gao, P., Mawet, D., Bond, C., Cetre, S., Wizinowich, P., De Rosa, R., Ruane, G., Liu, M., Absil, O., Alvarez, C., Baranec, C., Choquet, E., Chun, M., Defrere, D., Delorme, J.-R., Duchene, G., Forsberg, P., Ghez, A., Guyon, O., Hall, D., Huby, E., Jolivet, A., Jensen-Clem, R., Jovanovic, N., Karlsson, M., Lilley, S., Matthews, K., Menard, F., Meshkat, T., Millar-Bla M., **Ngo, H.**, Orban de Xivry, G., Pinte, C., Ragland, S., Serabyn, E., Catalan, E., Wang, J., Wetherell, E., Williams, J., Ygouf, M., Zuckerman, B. (2020) "Keck/NIRC2 L'-band imaging of Jovian-mass accreting protoplanets around PDS 70." The Astronomical Journal, 159, 263.

[25] Bryan, M., Chiang, E., Bowler, B., Morley, C., Millholland, S., Blunt, S., Ashok, K., Nielsen, E., **Ngo, H.**, Mawet, D., Knutson, H. (2020) "Obliquity constraints on an extrasolar planetary-mass companion." The Astronomical Journal, 159, 181.

[24] Blunt, S., Wang, J., Angelo, I., **Ngo, H.**, Cody, D., De Rosa, R., Graham, J., Hirsch, L., Nagpal, V., Nielsen, E., Pearce, L., Rice, M., Tejada, R. (2020) "orbitize!: A comprehensive orbit-fitting software package for the high-contrast imaging community." The Astronomical Journal, 159, 89.

[23] Ruane, G., **Ngo, H.**, Mawet, D., Absil, O., Choquet, E., Cook, T., Gomez Gonzalez, C., Huby, E., Matthews, K., Meshkat, T., Reggiani, M., Serabyn, E., Wallack, N., Xuan, W. J. (2019) "Reference star differential imaging of close-in companions and circumstellar disks with the NIRC2 vortex coronagra at W. M. Keck Observatory." The Astronomical Journal, 157, 118.

[22] Bryan, M., Knutson, H., Lee, E., Fulton, B., Batygin, K., **Ngo, H.**, Meshkat, T. (2019) "An excess of Jupiter analogs in super-Earth systems." The Astronomical Journal, 157, 52.

[21] Borkovits, T., Albrecht, S., Rappaport, S., Nelson, L., Vanderburg, A., Gary, B. L., Tan, T. G., Justesen, A. B., Kristiansen, M. H., Jacobs, T. L., LaCourse, D., **Ngo, H.**, Wallack, N., Ruane, G., Mawet, D., Howell, S. B., Tronsgaard, R. (2018) "EPIC 219217635: a doubly eclipsing quadruple system containing an evolved binary." Monthly Notices of the Royal Astronomical Society, 478, 5135.

[20] Huby, E., Bottom, M., Femenia, B., **Ngo, H.**, Mawet, D., Serabyn, E., Absil, O. (2017) "On-sky performance of the QACITS pointing control technique with the Keck/NIRC2 vortex coronagraph." Astronomy & Astrophysics, 600, A46.

[19] Oberst, T., Rodriguez J., Colón, K., Angerhausen, D., Bieryla, A., **Ngo, H.**, Stevens, D., Stassun, K., Gaudi, B. S., Pepper, J., Penev, K., Mawet, D., Latham, D., Heintz, T., Osei, B., Collins, K., Kielkopf, J., Visgaitis, T., Reed, P., Escamilla, A., Yazdi, S., McLeod, K., Lunsford, L., Spencer, M., Joner, M., Gregorio, J., Gaillard, C., Matt, K., Dumont, M., Stephens, D., Cohen, D., Jensen, E., Novati, S. C.,

Bozza, V., Labadie-Bartz, J., Siverd, R., Lund, M., Beatty, T., Eastman, J., Penny, M., Manner, M., Zambelli, R., Fulton, B., Stockdale, C., DePoy, D., Marshall, J., Pogge, R., Gould, A., Trueblood, M., Trueblood, P. (2017) "KELT-16b: A Highly Irradiated, Ultra-short Period Hot Jupiter Nearing Tidal Disruption." The Astronomical Journal, 153, 97.

[18] Rappaport, S., Vanderburg, A., Borkovits, T., Kalomeni, B., Halpern, J.P., **Ngo, H.**, Mace, G. N., Fulton, B.J., Howard, A.W., Isaacson, H., Petigura, E.A., Mawet, D., Kristiansen, M.H., Jacobs, T.L., LaCourse, D., Bieryla, A., Forgacs-Dajka, E., Nelson, L. (2017), "EPIC 220204960: A Quadruple Star System Containing Two Strongly Interacting Eclipsing Binaries." Monthly Notices of the Royal Astronomical Society, 467, 2160.

[17] Cartier, K., Beatty, T., Zhao, M., Line, M., **Ngo, H.**, Mawet, D., Stassun, K., Wright, J., Kreidberg, L., Fortney, J., Knutson, H. (2017), "Near-IR emission spectrum of WASP-103b using Hubble Space Telescope/Wide Field Camera 3." Astronomical Journal, 153, 34.

[16] Bowler, B., Liu, M., Mawet, D., **Ngo, H.**, Malo, L., Mace, G., McLane, J., Lu, J., Tristan, I., Hinkley, S., Hillenbrand, L., Shkolnik, E., Benneke, B., Best, W. (2017), "Planets around low-mass stars (PALMS). VI. Discovery of a remarkably red planetary-mass companion to the AB Dor moving group candidate 2MASS J22362452+4751425." Astronomical Journal, 153, 18.

[15] Bayliss, D., Hojjatpanah, S., Santerne, A., Dragomir, D., Zhou, G., Shporer, A., Colón, K. D., Almenara, J., Armstrong, D. J., Barrado, D., Barros, S. C. C., Bento, J., Boisse, I., Bouchy, F., Brown, D. J. A., Brown, T., Cameron, A., Cochran, W. D., Demangeon, O., Deleuil, M., Díaz, R. F., Fulton, B., Horne, K., Hébrard, G., Lillo-Box, J., Lovis, C., Mawet, D., **Ngo, H.**, Osborn, H., Palle, E., Petigura, E., Pollacco, D., Santos, N., Sefako, R., Siverd, R., Sousa, S. G., Tsantaki, M. (2017), "EPIC201702477b: A Transiting Brown Dwarf from K2 in a 41 day orbit." Astronomical Journal, 153, 15.

[14] Rappaport, S., Lehmann, H., Kalomeni, B., Borkovits, T., Latham, D., Bieryla, A., **Ngo, H.**, Mawet, D., Howell, S., Horch, E., Jacobs, T. L., LaCourse, D., Sodor, A., Vanderburg, A., Pavlovski, K. (2016), "A quintuple star system containing two eclipsing binaries." Monthly Notices of the Royal Astronomical Society, 462, 1812.

[13] Bryan, M., Knutson, H., Howard, A., **Ngo, H.**, Batygin, K., Crepp, J., Fulton, B., Hinkley, S., Isaacson, H., Johnson, J., Marcy, G., Wright, J. (2016), "Statistics of long period gas giant planets in known planetary systems." Astrophysical Journal, 821, 89.

[12] Lehmann, H., Borkovits, T., Rappaport, S., **Ngo, H.**, Mawet, D., Csizmadia, Sz., Forgács-Dajka (2016), "KIC 7177553: A quadruple system of two close binaries." Astrophysical Journal, 819, 33.

[11] Piskorz, D., Knutson, H., **Ngo, H.**, Muirhead, P., Batygin, K., Crepp, J., Hinkley, S., Morton, T. (2015), "Friends of Hot Jupiters III: An Infrared Spectroscopic Search for Low-Mass Stellar Companion Astrophysical Journal, 814, 148.

[10] Zhao, M., O'Rourke, J., Wright, J., Knutson, H., Burrows, A., Fortney, J., **Ngo, H.**, Fulton, B., Baranec, C., Riddle, R., Law, N., Muirhead, P., Hinkley, S., Showman, A., Curtis, J., Burrus, R. (2014), "Characterization of the Atmosphere of the Hot Jupiter HAT-P-32Ab and the M-Dwarf Companion HAT-P-32B." Astrophysical Journal, 796, 115.

[9] Bechter, E., Crepp, J., **Ngo, H.**, Knutson, H., Batygin, K., Hinkley, S., Muirhead, P., Johnson, J., Howard, A., Montet, B., Matthews, C., Morton, T. (2014),"WASP-12b and HAT-P-8b are Members of Triple Star Systems." Astrophysical Journal, 788, 2.

[8] Knutson, H., Fulton, B., Montet, B., Kao, M., **Ngo, H.**, Howard, A., Crepp, J., Hinkley, S., Bakos,

G., Batygin, K., Johnson, J., Morton, T., Muirhead, P. (2014),"Friends of Hot Jupiters. I. A Radial Velocity Search for Massive, Long-Period Companions to Close-In Gas Giant Planets." Astrophysical Journal, 785, 126.

[7] Greenstreet, S., Gladman, B., **Ngo, H.**, Granvik, M., Larson, S. (2012),"Production of Near-Earth Asteroids on Retrograde Orbits." Astrophysical Journal Letters, 749, L39.

[6] Greenstreet, S., **Ngo, H.**, Gladman, B. (2012), "The Orbital Distribution of Near-Earth Objects Inside Earth's Orbit." Icarus, 217, 355.

[5] Dinelle, K., **Ngo, H.**, Blinder, S., Vafai, N., Topping, G., Sossi,V. (2011), "Frame-to-frame image realignment assessment tool for dynamic brain positron emission tomography." Medical Physics, 38, 773.

[4] Braglia, F., Ade, P. A. R., Bock, J. J., Chapin, E. L., Devlin, M. J., Edge, A., Griffin, M., Gundersen, J. O., Halpern, M., Hargrave, P. C., Hughes, D. H., Klein, J., Marsden, G., Mauskopf, P., Moncelsi, L., Netterfield, C. B., **Ngo, H.**, Olmi, L., Pascale, E., Patanchon, G., Pimbblet, K. A., Rex, M., Scott, D., Semisch, C., Thomas, N., Truch, M. D. P., Tucker, C., Tucker, G. S., Valiante, E., Viero, M. P., Wiebe, D. V. (2011), "Submillimetre observations of galaxy clusters with BLAST: the star formation activity in Abell 3112." Monthly Notices of the Royal Astronomical Society, 412, 1187.

[3] Pascale, E., Ade, P. A. R., Bock, J. J., Chapin, E. L., Devlin, M. J., Dye, S., Eales, S. A., Griffin, M., Gundersen, J. O., Halpern, M., Hargrave, P. C., Hughes, D. H., Klein, J., Marsden, G., Mauskopf, P., Moncelsi, L., Netterfield, C. B., **Ngo, H.**, Olmi, L., Patanchon, G., Rex, M., Scott, D., Semisch, C., Thomas, N., Truch, M. D. P., Tucker, C., Tucker, G. S., Viero, M. P., Wiebe, D. V. (2009), "BLAST: A Far-Infrared Measurement Of The History Of Star Formation ." Astrophysical Journal, 707, 1740.

[2] Marsden, G., Ade, P. A. R., Bock, J. J., Chapin, E. L., Devlin, M. J., Dicker, S. R., Griffin, M., Gundersen J. O., Halpern, M., Hargrave, P. C., Hughes, D. H., Klein, J., Mauskopf, P., Magnelli, B., Moncelsi, L., Netterfield, C. B., **Ngo, H.**, Olmi, L., Pascale, E., Patanchon, G., Rex, M., Scott, D., Semisch, C., Thomas, N., Truch, M. D. P., Tucker, C., Tucker, G. S., Viero, M. P., Wiebe, D. V. (2009), "BLAST: Resolving The Cosmic Submillimeter Background." Astrophysical Journal, 707, 1729.

[1] Devlin, M. J., Ade, P. A. R., Aretxaga, I., Bock, J. J., Chapin, E. L., Griffin, M., Gundersen, J. O., Halpern, M., Hargrave, P. C., Hughes, D. H., Klein, J., Marsden, G., Martin, P. G., Mauskopf, P., Moncelsi, L., Netterfield, C. B., **Ngo, H.**, Olmi, L., Pascale, E., Patanchon, G., Rex, M., Scott, D., Semisch, C., Thomas, N., Truch, M. D. P.,Tucker, C., Tucker, G. S.,Viero, M. P., Wiebe, D. V. (2009), "Over half of the far-infrared background light comes from galaxies at $z \geq 1.2$." Nature, 458, 737.

Selected Conference Presentations and Proceedings

[18] "Big planets, little stars: Directly imaged companions to young M-stars," 20th Cool Stars Workshop, 29 July - 3 August, 2018. Poster presentation & best postdoc poster prize talk.

[17] "Bayesian analysis of the dynamical influence of companion stars in warm and hot Jupiter exoplanet systems," Canadian Astronomical Society Meeting, 22-26 May, 2018.

[16] "Direct imaging search for the 'missing link' in giant planet formation," American Astronomical Society Meeting, 8-12 January, 2018.

[15] "Giant planet formation and migration in multi-stellar systems," Aspen Winter Conference: Formation and Dynamical Evolution of Exoplanets, 26 March - 1 April, 2017.

[14] “Using direct imaging to investigate the formation and migration histories of gas giant exoplanets,” Thesis talk, American Astronomical Society Meeting, 3-7 January 2017.

[13] “Using direct imaging to investigate the formation and migration histories of gas giant exoplanets,” Division of Planetary Science Meeting, 16-21 October 2016.

[12] “Giant planets around young M-dwarfs,” 1st international vector vortex coronagraph workshop, 15-17 August 2016.

[11] “Friends of hot Jupiters IV,” Exoplanets I, 3-8 July 2016.

[10] “Friends of Hot Jupiters: Properties of the Directly Imaged Stellar Companion Population,” Canadian Astronomical Society Meeting, 30 May - 2 June 2016.

[9] “Companion-driven dynamics: Trends in stellar companion fraction and giant exoplanet properties,” Extreme Solar Systems III, 29 November - 4 December 2015.

[8] “Friends of Hot Jupiters II: No Correspondence Between Hot-Jupiter Spin-Orbit Misalignment and the Incidence of Directly Imaged Stellar Companions,” American Astronomical Society Meeting, 4-8 January 2015.

[7] “Friends of Hot Jupiters: Finding Distant Stellar Companions with NIRC2 AO,” Characterizing Planetary Systems Across the HR Diagram meeting, 28 July - 1 August 2014.

[6] **Ngo, H.**, Duncan, M., Levison, H. (2014), “LIPAD Simulations of Giant Planet Core Formation.” Exploring the Formation and Evolution of Planetary Systems, Proceedings of the International Astronomi Union, IAU Symposium, Volume 299, pp. 171-172.

[5] ”Cold Friends of Hot Jupiters: AO Survey,” Division of Planetary Science Meeting, 6-11 October 2013.

[4] “Simulations of Giant Planet Core Formation,” Division on Dynamical Astronomy Meeting, 6-10 May 2012.

[3] “NEOSSat’s new NEO orbital model,” Division of Planetary Science Meeting, 3-7 October 2011.

[2] **Ngo, H.**, Dinelle, K., Blinder, S., Vafai, N., Topping, G., Sossi, V. (2009), “Quality Control Protocol for Frame-to-Frame PET Motion Correction.” IEEE Nuclear Science Symposium and Medical Imaging Conference Record 2009, p. 3622-3627.

[1] “BLAST resolves origins of Cosmic Infrared Background,” American Physical Society Northwest Section Meeting, 15 May 2009.