

**A. Biographical Information***1. Personal*

Name: Peter Gordon Martin

Date of Birth: 19/09/1947

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*2. Degrees*

B. Sc.	1968	Math. and Physics	Arts and Science	U. of Toronto
M. Sc.	1969	Astrophysics	Astronomy	U. of Toronto
Ph. D.	1972	Astrophysics	Applied Mathematics and Theoretical Physics	U. of Cambridge

Ph. D. Thesis: On the Composition and Alignment of Interstellar Grains

Ph. D. Supervisors: Dennis W. Sciama and Martin J. Rees

*3. Employment**3a. Present, at University of Toronto*

Professor, Canadian Institute for Theoretical Astrophysics (CITA)

*3b. History over my 51+ years as a faculty member at the University of Toronto*

Appointed Assistant Professor, 1972;

to the School of Graduate Studies, 1973;

tenure awarded and promoted to Associate Professor, 1976;

promoted to Professor, 1980;

first faculty member and Interim Director, CITA, 1984 – 85;

Acting Director, CITA, 1989;

Associate Director, CITA, 1999;

Chair, Department of Astronomy and Astrophysics, 1999–2010;

Director, David Dunlap Observatory, 1999–2008;

Interim Director, Dunlap Institute for Astronomy and Astrophysics, 2008–10;

Acting Vice-Dean Research and Graduate Programs, 2011 (Jul–Dec);

Acting Director, Dunlap Institute, 2012–2013;

Interim Director, Dunlap Institute, 2013–2014;

Acting Director, Dunlap Institute, 2014 (Jul–Dec);

Associate Director, CITA, 2022 –

3c. *Visiting Academic Appointments (reverse chronology)*

2019, 09	Professeur invité	Institut Pascal	U. Paris-Saclay
2018, 10	Professeur invité	Institut d'astrophysique spatiale	U. Paris Sud
2018, 03-04	Professeur invité	LERMA	L'Ecole normale supérieure, Paris
2017, 07	Professeur invité	Institut d'astrophysique spatiale	U. Paris Sud
2007, 04-05	Professeur invité	Institut d'astrophysique spatiale	U. Paris Sud
2002, 03-04	Professeur invité	Institut d'astrophysique spatiale	U. Paris Sud
2002, 01-06	Visiting Associate	Theoretical Astrophysics	Caltech
2002, 01-06	Distinguished Visit. Scientist	IPAC	Jet Propulsion Laboratory, Caltech
2001, 09-12	Distinguished Visit. Scientist	Long Wave. Ctr. Excellence	JPL
1992-93	Visiting Associate	Theoretical Astrophysics	Caltech
1992-93	Guest Investigator	IPAC	JPL
1986-87	Visiting Professor	Lick Observatory	U. C. Santa Cruz
1978-79	Senior Visiting Fellow	Institute of Astronomy and Churchill College	U. of Cambridge
1978-79	Visiting Professor	Steward Observatory	U. of Arizona

Prehistoric Teaching and Research Experience (reverse chronology)

1969-71	Computing lab. instructor	Applied Mathematics	U. of Cambridge
1968-69	Laboratory instructor	Astronomy	U. of Toronto
1967-68	Marker	Physics	U. of Toronto
1966-68	Tutor	Mathematics	U. of Toronto
1967	Research assistant (summer)	Radio astronomy	NRC, Ottawa
1966	Research assistant (summer)	Upper atmos. physics	NRC, Ottawa

#### 4. Awards, Honours

2020	Fellow, Royal Canadian Geographical Society
2019	Giuseppe and Vanna Cocconi Prize, Planck Collaboration, European Physical Society
2018	Gruber Cosmology Prize, Planck Team, Gruber Foundation
2018	Group Achievement Award, Planck Team, Royal Astronomical Society
2017	Publications Research Award for Research in Art (Mystical Landscapes co-authors, for the exhibition jointly presented at the Art Gallery of Ontario and the Musée d'Orsay), Canadian Museums Association
2016	Officer of the Order of Canada
2014	Executive Award for Outstanding Service, Canadian Astronomical Society
2014	Group Achievement Award, Herschel-SPIRE Consortium, Royal Astronomical Society
2013	Queen Elizabeth II Diamond Jubilee Medal, through the Royal Society of Canada
2013–	Continuing (Lifetime) Senior Fellow, Massey College, University of Toronto
2012&13	Literary Arts Program Residency, the Banff Centre
2012	40 Year Service Award, University of Toronto
2007	Fellow, Royal Society of Canada
2006-08	President, Canadian Astronomical Society
1999-13	Senior Fellow, Massey College, University of Toronto
1994	C.S. Beals Award (outstanding achievement in research), Canadian Astronomical Society
1972	NATO postdoctoral fellowship (Caltech, declined)
1969-72	Commonwealth Scholar (University of Cambridge)
1969	NRC postgraduate scholarship (declined)
1968-69	NRC postgraduate scholar
1968	Gold Medal, Royal Astronomical Society of Canada
1968	S.H. Janes Silver Medal, Victoria University in the University of Toronto

## B. Academic History

I have enjoyed immensely the pursuit of basic research in several areas of astrophysics and am still heavily engaged and having an impact internationally. It is a real privilege to work in a discipline that has changed so profoundly during my career and continues to surprise us. This has motivated me in teaching, training, and mentoring many high quality students and postdoctoral fellows, and in turn I draw inspiration from these fresh minds. Professionally, I have worked to put in place “crucibles of creativity,” whether workshops, scientific meetings, summer schools, national long-range plans, international research collaborations, or entire new institutes such as CITA and the Dunlap Insitute, so that the players in the field are not only nurtured and sustained but also enabled to advance through individual and collaborative effort and insight toward greater understanding. There is a real thirst in the general public for knowledge about the universe and so I have devoted much thought and application to outreach and to evaluating its effectiveness.

### 6a. *Research Endeavours – current*

A revolution in interstellar medium studies is under way with the second data release by ESA’s Gaia satellite in 2018. The primary catalogue has accurate distance measurements for over a billion stars. This staggering accomplishment is complemented by astrophysical parameters (effective temperature, luminosity, radius, interstellar extinction) for an unprecedented 80 to 160 million stars. I have started mining this dataset with my students and am very excited by its promise to impact our science in cross-cutting ways. Graduate student J. Campbell has used this data in her completed PhD thesis relating submm emission to dust extinction.

The following are the science themes of my current research programs.

- Foregrounds, Component Separation, and High Latitude Dust. Dust emission produces one of the unwanted foregrounds to the cosmological Cosmic Microwave Background and to far-infrared searches for distant (hence seen as young) galaxies and unresolved sources; we studied both with Planck, most recently dust polarization.
- Star formation and structure in the interstellar medium. Our goal with the new far-infrared and submm data is to discover and characterize the very early stages of star formation, essentially cold dense cores hitherto undetectable. Herschel detects cold dust by its submillimeter radiation, making all the difference. The topology of the magnetic field and its relationship to structure is studied via dust polarization seen in emission, with both Planck and BLASTpol and BLAST-TNG.

Starting with my GHIGLS and DHIGLS HI surveys, we are revealing the presence of distinct thermal phases co-existing in the interstellar medium. The influence of dynamical interactions on initiating this phase transition is being explored with postdoc Marchal and several undergraduates and international MSc students in a wide variety of environments, from local gas to high velocity gas entering the Galaxy for the first time.

- Evolution of Interstellar Dust. Key dust properties, like size distribution and chemical composition, show remarkable changes in different phases of the ISM (traceable because different dust components have characteristic spectral emissivities). To complement studies with both Herschel and Planck I have developed a unique new probe, scattered light, using the Dragonfly telephoto lens array. The pioneering paper has been published with former graduate student J. Zhang.

I am also examining optical-near infrared extinction of highly obscured background stars to characterize the relationship of extinction to submillimetre opacity. This is revealing variations with environment, further evidence for dust evolution.

To address these themes, all of the specific projects below have been very active and leading to refereed journal publications.

- Planck was a survey mission (launched 2009 with Herschel, see below) to study fluctuations in the cosmic microwave background (CMB), but in the course of its all-sky mapping it has provided unprecedented rich information on the Galaxy, including polarization. As a Planck Scientist (HFI Core team), one of three in Canada, I have led Planck Working Group 7 (Galactic and Solar System Science). As part of the third data release of all-sky maps and papers I focused on

- All sky dust polarization
- All sky dust optical depth and temperature

- Topology of the Galactic magnetic field and its relationship to structure in the interstellar medium
- Quality of products from component separation of the CMB and foregrounds

As well I have been an active member of the Editorial Board, recently responsible for the last of the new papers accompanying the third data release and several more in the ongoing Intermediate Results series. An independent data processing pipeline (NPIPE) has been developed over the past few years. I worked with the team responsible for the extensive internal review and related testing and validation of the quality of the all-sky maps produced. This has led to the final official data release.

- Green Bank 100-m Telescope (GBT). This was used for my GHIGLS HI survey, which was the key also to DHIGLS. Two complementary surveys of molecular gas structure and dynamics have been carried out in star-forming regions.
  - GBT Ammonia Survey (GAS), PI R. Friesen (started while at Dunlap). Molecular line survey of the Gould Belt low mass star-forming regions (completed and publications arising)
  - KEYSTONE, PI J. DiFrancesco. Ammonia survey of the Herschel HOBYS high mass star-forming regions. (observations complete, analysis under way)
- Herschel Space Observatory was a 3.5-m far-infrared observatory for imaging (SPIRE/PACS). In addition to the Hi-GAL Galactic Plane Survey, our refined programs on dust evolution and cold precursors to star formation used the imaging instruments SPIRE and PACS. This year the main effort, with graduate student A. Singh who completed her PhD, has been analyzing the uncertainties in the frequency maps which underlie reliable production of column density and temperature maps that we prepared to complement the GAS collaboration observations of ammonia in the Gould Belt molecular clouds.
- Dragonfly telephoto array. This novel facility has been developed by R. Abraham (DAA, Toronto) and P. van Dokkum (Yale) (I was co-I on the original NSERC RTI grant and another successful follow-up). A five-fold expansion has been completed and observations are now scheduled remotely every night. An even larger facility with more telescopes, new cameras, and with narrow-band filters to study emission lines is under construction.

My role is to analyze observations of scattered light from dust in the Milky Way Galaxy, a contaminating foreground for Dragonfly's extragalactic observations. I have identified and removed unexpected flat fielding imperfections in wide angle optical data; the approach to flat fielding and removal of scattered aureoles of bright stars will need to be perfected for upcoming deep extragalactic programs and this is proceeding with a new PhD student Q. Liu.

With PhD student A. Singh, I completed extensive deep imaging of the closest (so-called Gould Belt) molecular clouds, which promises new insight into their three-dimensional structure and the anisotropy of the local interstellar radiation field. A MITACS GRI student is working on this with me this summer.

- BLASTpol. Drawing on my expertise in dust polarization, I have been working closely with the international team on the polarizing properties of dust and inferences from polarization for the dynamical influence of magnetic fields in regions of star formation. We have also made pioneering observations of the frequency dependence of the polarization, which rules out a class of dust models.

The following have been my investments in future programs:

- James Webb Space Telescope (JWST) is the successor to the Hubble Space Telescope, funded by NASA, ESA, and the CSA. It will concentrate on near to mid infrared imaging and spectroscopy. Since 2002 (!), I have been participating in the international Science Team (one of three Canadian members) for NIRCcam (the premier imaging instrument around which JWST has been designed). My goal is to use the unprecedented high spatial resolution and sensitivity to see the clusters of massive stars in these stellar nurseries, to date hidden by dense layers of dust within the submillimeter cores that we have discovered with Herschel, and to study the extinction structure in these clouds. After all of the preparation, and repeated spacecraft delays, the JWST was launched in late 2021. It has deployed all instruments through initial testing and is working to specification!! Our first results are being presented at conferences and published.
- BLAST-TNG was a new stratospheric submillimeter telescope (PI M. Devlin). First funded for five years in 2013, this 2.5-m balloon-borne stratospheric telescope was built to make observations of dust polarization to

investigate magnetic fields in regions of star formation. I contributed to science planning for the first Antarctic flight launched in January 2020. Disappointingly, the balloon gondola was damaged during the launch (no fault of the BLAST team). Rather than remaining aloft for the planned 20 days of observations, the payload was parachuted down soon after reaching the stratosphere, though not before some unique and valuable calibration and characterization of the new hardware had been accomplished. An entirely new telescope and instruments are being planned for launch in about 2025.

#### 6b. Recent Research Awards

Research Grants (Amounts in k\$Cdn)

2022-27	NSERC DIS – CITA (Co-I)	5,767
2022	MITACS Global Research Internship (PI mentor)	≈15
2023	MITACS Global Research Internship (PI mentor)	≈15
2018-24	NSERC Discovery (PI)	300

#### Gravity of Fundamental Astrophysics Research (GoFAR)

In 2017 I coordinated the preparation of the successful Phase 1 proposal for the Canada Excellence Research Chairs competition (\$10 M over seven years). This effort was continued with a successful phase 2 nomination (awarded March 2019). Regrettably, efforts to recruit the designated senior scholar came to an end only in March 2020 forgoing an excellent opportunity to pivot.

Infrastructure and Equipment Grants (Amounts in M\$Cdn)

2020	CFI Innovation – Massive Dragonfly Upgrade (Co-I)	4.5
2016	NSERC RTI – (second for) Dragonfly (Co-I)	0.13
2015-20	NASA – BLAST-TNG (Co-I)	5

#### National/International “Big-Science” Infrastructure

Finally, after national efforts that we started way back in 2002, our national Thirty Metre Telescope (TMT) planning/steering committee was delighted that the Canadian government has provided \$243 M for our participation in the TMT. As of 2015, Canada became a major partner in the Thirty Meter Telescope International Observatory LLC, along with China, India, Japan, and the US. Construction on Mauna Kea in Hawaii awaits resolution of complex land-use agreements.

#### 6c. Time allocations at major ground and space-based observatories

These allocations were awarded through peer-reviewed international competition.

Recent allocations (alphabetical; 2005–)

- Dominion Radio Astrophysical Observatory (DRAO) – Int’l Galactic Plane Survey
- DRAO – Planck Deep Fields
- Gemini/GPI – Adaptive optics polarimetry of TP AGB stars
- Green Bank Telescope (GBT) – Planck Deep Fields
- GBT – HI surveys of High Velocity Clouds
- GBT – HI surveys of Intermediate Velocity Clouds
- GBT – North Ecliptic Pole survey
- GBT – MUSTANG observations of Orion
- GBT – Green Bank Ammonia Survey (GAS) and KEYSTONE, kinematics and chemistry
- Herschel Space Observatory (HSO) – Gould Belt Survey
- HSO – High Mass Star Formation (HOBYS)

HSO – Evolution of Dust (SPIRE SAG4)  
 HSO – HiGAL: Survey of Galactic Plane, and Hi-GAL 360  
 HSO – Dust Evolution in the Spider and Draco  
 HSO – Spectroscopy of Interstellar Molecules with HIFI  
 HSO and Planck – Cold Clumps  
 IRAM and GBT – Molecular gas in the Draco Nebula  
 James Clerk Maxwell Telescope (JCMT) – Galactic Plane Survey  
 JCMT – W3 Giant Molecular Cloud  
 Planck – key projects on the interstellar medium, using brightness and polarization  
 Spitzer Space Telescope – MIPS GAL Galactic plane survey

## C. Scholarly and Professional Work

### 7a. Refereed Publications (reverse chronological)

- When last checked, August 2023, the following statistics were retrieved from the SAO/NASA Astrophysics Data System ([www.adsabs.harvard.edu](http://www.adsabs.harvard.edu)): **429 journal papers, 85539 citations, h index 116**. Alternatives can be sought using my ORCID iD: 0000-0002-5236-3896.
- Liu, Q., Abraham, R., Martin, P. G., Bownam, W. P., van Dokkum, P., Janssens, S., Chen, S., Keim, M. A., Lokhorst, D., Pasha, I., Shen, Z., and Zhang, J. *A Recipe for Unbiased Background Modeling in Deep Wide-Field Astronomical Images*, *The Astrophysical Journal*, **953**, 7, 2023
- Vujeva, L., Marchal, A., Martin, P. G., and Taank, M. *Mapping the Thermal Condensation of Diffuse H I in the North Celestial Pole Loop*, *The Astrophysical Journal*, **951**, 120, 2023
- Zhang, J., Martin, P. G., Cloutier, R., Price-Jones, N., Abraham, R., van Dokkum, P., and Merritt, A. *Joint modelling of dust scattering and thermal emission: the Spider complex*, *The Astrophysical Journal*, **948**, 4, 2023
- Gardner, J. P., Mather, J. C., Abbott, R., and 1005 colleagues. *The James Webb Space Telescope Mission, Publications of the Astronomical Society of the Pacific*, **135**, 068001, 2023
- Rieke, M. J., Kelly, D. M., Misselt, K., and 52 colleagues. *Performance of NIRCcam on JWST in Flight, Publications of the Astronomical Society of the Pacific*, **135**, 028001, 2023
- Marchal, A. and Martin, P. G. *On the Origin of the North Celestial Pole Loop*, *The Astrophysical Journal*, **942**, 70, 2023
- Singh, A. and Martin, P. G. *Herschel Optimized Tau and Temperature (HOTT) Maps: Uncertainty Analysis and Robust Parameter Extraction*, *The Astrophysical Journal*, **941**, 135, 2022
- Elia, D., Molinari, S., Schisano, E., and 23 colleagues. *The Star Formation Rate of the Milky Way as Seen by Herschel*, *The Astrophysical Journal*, **941**, 162, 2022
- Taank, M., Marchal, A., Martin, P. G., and Vujeva, L. *Mapping the Thermal Condensation of Diffuse H I in the North Celestial Pole Loop*, *The Astrophysical Journal*, **937**, 81, 2022
- Liu, Q., Abraham, R., Gilhuly, C., and 14 colleagues. *A Method to Characterize the Wide-angle Point-Spread Function of Astronomical Images*, *The Astrophysical Journal*, **925**, 219, 2022
- Singh, A., Matzner, C. D., Friesen, R. K., Martin, P. G., and 21 colleagues. *Are Massive Dense Clumps Truly Subvirial? A New Analysis Using Gould Belt Ammonia Data*, *The Astrophysical Journal*, **922**, 87, 2021
- Marchal, A., Martin, P. G., and Gong, M. *Resolving the Formation of Cold H I Filaments in the High-velocity Cloud Complex C*, *The Astrophysical Journal*, **921**, 11, 2021
- Elia, D., Merello, M., Molinari, S., and 29 colleagues. *The Hi-GAL compact source catalogue - II. The 360 catalogue of clump physical properties*, *Monthly Notices of the Royal Astronomical Society*, **504**, 2742, 2021
- Di Francesco, J., Keown, J., Fallscheer, C., and 17 colleagues. *Herschel Gould Belt Survey Observations of Dense Cores in the Cepheus Flare Clouds*, *The Astrophysical Journal*, **904**, 172, 2020
- Lowe, I., Coppi, G., Ade, P. A. R., and 30 colleagues. *The Balloon-borne Large Aperture Submillimeter Telescope Observatory*, *Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series*, **11445**, 114457A, 2020
- Choudhury, S., Pineda, J. E., Caselli, P., and 15 colleagues. *Ubiquitous NH<sub>3</sub> supersonic component in L1688 coherent cores, Aumont, and 117 colleagues*. *Astronomy and Astrophysics*, **640**, L6, 2020

- Chen, C.-Y., Behrens, E., Washington, J., and 26 colleagues. *Relative alignment between dense molecular cores and ambient magnetic field: the synergy of numerical models and observations*, *Monthly Notices of the Royal Astronomical Society*, **494**, 1971-1987, 2020
- Planck Collaboration, Akrami, Y., Andersen, K. J., and 137 colleagues. *Planck intermediate results. LVII. Joint Planck LFI and HFI data processing*, *Astronomy and Astrophysics*, **643**, A42, 2020
- Planck Collaboration, Akrami, Y., Ashdown, M., and 124 colleagues. *Planck intermediate results. LVI. Detection of the CMB dipole through modulation of the thermal Sunyaev-Zeldovich effect: Eppur si muove II*, *Astronomy and Astrophysics*, **644**, A100, 2020
- Planck Collaboration, Akrami, Y., Ashdown, M., and 118 colleagues. *Planck intermediate results. LV. Reliability and thermal properties of high-frequency sources in the Second Planck Catalogue of Compact Sources*, *Astronomy and Astrophysics*, **644**, A99, 2020
- Adak, D., Ghosh, T., Boulanger, F., and 5 colleagues. *Dust polarization modeling at large-scale over the Northern Galactic cap using EBHIS and Planck data*, *Astronomy and Astrophysics*, **640**, A100, 2020
- Planck Collaboration, Aghanim, N., Akrami, Y., and 160 colleagues. *Planck 2018 results. XII. Galactic astrophysics using polarized dust emission*, *Astronomy and Astrophysics*, **641**, A12, 2020
- Planck Collaboration, Akrami, Y., Ashdown, M., and 131 colleagues. *Planck 2018 results. XI. Polarized dust foregrounds*, *Astronomy and Astrophysics*, **641**, A11, 2020
- Planck Collaboration, Akrami, Y., Arroja, F., and 173 colleagues. *Planck 2018 results. X. Constraints on inflation*, *Astronomy and Astrophysics*, **641**, A10, 2020
- Planck Collaboration, Akrami, Y., Arroja, F., and 157 colleagues. *Planck 2018 results. IX. Constraints on primordial non-Gaussianity*, *Astronomy and Astrophysics*, **641**, A9, 2020
- Planck Collaboration, Aghanim, N., Akrami, Y., and 155 colleagues. *Planck 2018 results. VIII. Gravitational lensing*, *Astronomy and Astrophysics*, **641**, A8, 2020
- Planck Collaboration, Aghanim, N., Akrami, Y., and 176 colleagues. *Planck 2018 results. VII. Isotropy and statistics of the CMB*, *Astronomy and Astrophysics*, **641**, A7, 2020
- Planck Collaboration, Aghanim, N., Akrami, Y., and 176 colleagues. *Planck 2018 results. VI. Cosmological parameters*, *Astronomy and Astrophysics*, **641**, A6, 2020
- Planck Collaboration, Aghanim, N., Akrami, Y., and 165 colleagues. *Planck 2018 results. V. CMB power spectra and likelihoods*, *Astronomy and Astrophysics*, **641**, A5, 2020
- Planck Collaboration, Akrami, Y., Ashdown, M., and 150 colleagues. *Planck 2018 results. IV. Diffuse component separation*, *Astronomy and Astrophysics*, **641**, A4, 2020
- Planck Collaboration, Aghanim, N., Akrami, Y., and 152 colleagues. *Planck 2018 results. III. High Frequency Instrument data processing and frequency maps*, *Astronomy and Astrophysics*, **641**, A3, 2020
- Planck Collaboration, Akrami, Y., Argüeso, F., and 148 colleagues. *Planck 2018 results. II. Low Frequency Instrument data processing*, *Astronomy and Astrophysics*, **641**, A2, 2020
- Planck Collaboration, Akrami, Y., Arroja, F., and 188 colleagues. *Planck 2018 results. I. Overview and the cosmological legacy of Planck*, *Astronomy and Astrophysics*, **641**, A1, 2020
- Fissel, L. M., Ade, P. A. R., Angilè, F. E., and 36 colleagues. *Relative Alignment Between the Magnetic Field and Molecular Gas Structure in the Vela C Giant Molecular Cloud using Low and High Density Tracers*, *The Astrophysical Journal*, **878**, 110, 2019
- Chen, H. H.-H., Pineda, J. E., Goodman, A. A., and 22 colleagues. *Droplets I: Pressure-Dominated Sub-0.1 pc Coherent Structures in L1688 and B18*, *The Astrophysical Journal*, **877**, 93, 2019
- Shariff, J. A., Ade, P. A. R., Angilè, F. E., and 27 colleagues. *Submillimeter Polarization Spectrum of the Carina Nebula*, *The Astrophysical Journal*, **872**, 197, 2019
- Planck Collaboration, Akrami, Y., Argüeso, F., and 138 colleagues. *Planck intermediate results. LIV. The Planck multi-frequency catalogue of non-thermal sources*, *Astronomy and Astrophysics*, **619**, A94, 2018
- Planck Collaboration, Aghanim, N., Akrami, Y., and 141 colleagues. *Planck intermediate results. LIII. Detection of velocity dispersion from the kinetic Sunyaev-Zeldovich effect*, *Astronomy and Astrophysics*, **617**, A48, 2018
- Ashton, P. C., Ade, P. A. R., Angilè, F. E., and 27 colleagues. *First Observation of the Submillimeter Polarization Spectrum in a Translucent Molecular Cloud*, *The Astrophysical Journal*, **857**, 10, 2018
- Jow, D. L., Hill, R., Scott, D., and 5 colleagues. *An application of an optimal statistic for characterizing relative orientations*, *Monthly Notices of the Royal Astronomical Society*, **474**, 1018, 2018

- Keown, J., Di Francesco, J., Kirk, H., and 20 colleagues. *The Green Bank Ammonia Survey: Observations of Hierarchical Dense Gas Structures in Cepheus-L1251*, *The Astrophysical Journal*, **850**, 3, 2017
- Planck Collaboration, Akrami, Y., Ashdown, M., and 147 colleagues. *Planck intermediate results. LII. Planet flux densities*, *Astronomy and Astrophysics*, **607**, A122, 2017
- Planck Collaboration, Aghanim, N., Akrami, Y., and 155 colleagues. *Planck intermediate results. LI. Features in the cosmic microwave background temperature power spectrum and shifts in cosmological parameters*, *Astronomy and Astrophysics*, **607**, A95, 2017
- Elia, D., Molinari, S., Schisano, E., and 83 colleagues. *The Hi-GAL compact source catalogue - I. The physical properties of the clumps in the inner Galaxy ( $-71.0^\circ < \ell < 67.0^\circ$ )*, *Monthly Notices of the Royal Astronomical Society*, **471**, 100, 2017
- Kirk, H., Friesen, R. K., Pineda, J. E., and 21 colleagues. *The Green Bank Ammonia Survey: Dense Cores under Pressure in Orion A*, *The Astrophysical Journal*, **846**, 144, 2017
- Eden, D. J., Moore, T. J. T., Plume, R., and 42 colleagues. *The JCMT Plane Survey: first complete data release - emission maps and compact source catalogue*, *Monthly Notices of the Royal Astronomical Society*, **469**, 2163, 2017
- Friesen, R. K., Pineda, J. E., co-PIs, and 23 colleagues. *The Green Bank Ammonia Survey: First Results of  $\text{NH}_3$  Mapping of the Gould Belt*, *The Astrophysical Journal*, **843**, 63, 2017
- Soler, J. D., Ade, P. A. R., Angilè, F. E., and 27 colleagues. *The relation between the column density structures and the magnetic field orientation in the Vela C molecular complex*, *Astronomy and Astrophysics*, **603**, A64, 2017
- Vansyngel, F., Boulanger, F., Ghosh, T., and 6 colleagues. *Statistical simulations of the dust foreground to cosmic microwave background polarization*, *Astronomy and Astrophysics*, **603**, A62, 2017
- Tigé, J., Motte, F., Russeil, D., and 33 colleagues. *The earliest phases of high-mass star formation, as seen in NGC 6334 by Herschel-HOBYS*, *Astronomy and Astrophysics*, **602**, A77, 2017
- Rivera-Ingraham, A., Ristorcelli, I., Juvela, M., and 15 colleagues. *Galactic cold cores. VIII. Filament formation and evolution: Filament properties in context with evolutionary models*, *Astronomy and Astrophysics*, **601**, A94, 2017
- Ghosh, T., Boulanger, F., Martin, P. G., and 8 colleagues. *Modelling and simulation of large-scale polarized dust emission over the southern Galactic cap using the GASS Hi data*, *Astronomy and Astrophysics*, **601**, A71, 2017
- Santos, F. P., Ade, P. A. R., Angilè, F. E., and 27 colleagues. *Comparing Submillimeter Polarized Emission with Near-infrared Polarization of Background Stars for the Vela C Molecular Cloud*, *The Astrophysical Journal*, **837**, 161, 2017
- Miville-Deschênes, M.-A., Salomé, Q., Martin, P. G., and 9 colleagues. *Structure formation in a colliding flow: The Herschel view of the Draco nebula*, *Astronomy and Astrophysics*, **599**, A109, 2017
- Planck Collaboration, Aghanim, N., Ashdown, M., and 156 colleagues. *Planck intermediate results. L. Evidence of spatial variation of the polarized thermal dust spectral energy distribution and implications for CMB B-mode analysis*, *Astronomy and Astrophysics*, **599**, A51, 2017
- Blagrove, K., Martin, P. G., Joncas, G., and 5 colleagues. *DHIGLS: DRAO H I Intermediate Galactic Latitude Survey*, *The Astrophysical Journal*, **834**, 126, 2017
- Planck Collaboration, Aghanim, N., Ashdown, M., and 148 colleagues. *Planck intermediate results. XLIX. Parity-violation constraints from polarization data*, *Astronomy and Astrophysics*, **596**, A110, 2016
- Planck Collaboration, Aghanim, N., Ashdown, M., and 157 colleagues. *Planck intermediate results. XLVIII. Disentangling Galactic dust emission and cosmic infrared background anisotropies*, *Astronomy and Astrophysics*, **596**, A109, 2016
- Planck Collaboration, Adam, R., Aghanim, N., and 165 colleagues. *Planck intermediate results. XLVII. Planck constraints on reionization history*, *Astronomy and Astrophysics*, **596**, A108, 2016
- Planck Collaboration, Aghanim, N., Ashdown, M., and 170 colleagues. *Planck intermediate results. XLVI. Reduction of large-scale systematic effects in HFI polarization maps and estimation of the reionization optical depth*, *Astronomy and Astrophysics*, **596**, A107, 2016
- Planck Collaboration, Ade, P. A. R., Aghanim, N., and 184 colleagues. *Planck intermediate results. XLV. Radio spectra of northern extragalactic radio sources*, *Astronomy and Astrophysics*, **596**, A106, 2016
- Planck Collaboration, Aghanim, N., Alves, M. I. R., and 165 colleagues. *Planck intermediate results. XLIV.*

- Structure of the Galactic magnetic field from dust polarization maps of the southern Galactic cap*, *Astronomy and Astrophysics*, **596**, A105, 2016
- Planck Collaboration, Adam, R., Ade, P. A. R., and 179 colleagues. *Planck intermediate results. XLIII. Spectral energy distribution of dust in clusters of galaxies*, *Astronomy and Astrophysics*, **596**, A104, 2016
- Planck Collaboration, Adam, R., Ade, P. A. R., and 175 colleagues. *Planck intermediate results. XLII. Large-scale Galactic magnetic fields*, *Astronomy and Astrophysics*, **596**, A103, 2016
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#### 8b. Books and Book Chapters

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- Martin, P. G. *Evolution of Novae: An Optical Perspective*, in *Classical Novae*, eds. M. F. Bode & A. Evans (John Wiley: New York, 1989), pp. 73-92.
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- Martin, P. G. *Beals Prize Lecture. Interstellar Pinball: A Sometimes Shocking Story of Excited Molecular Hydrogen*, *Journal of the Royal Astronomical Society of Canada*, **88**, 246, 1994.
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I stopped this list in 1996 because it was getting much too long! A few new abstracts might be referred to under “in preparation” or as non-referred publications where relevant to recent work.

### 9. Publications in Preparation (alphabetical by project)

These research papers for *The Astrophysical Journal* are the result of my joint work with postdocs, grad students, and undergraduates.

#### **DHIGLS and GHIGLS.**

Marchal, A., Martin, P. G., Miville-Dechenses, M.-A., McClure-Griffiths, N., Lynn, C., and Bracco, A. *Mapping a lower limit on the mass fraction of the cold neutral medium using Fourier transformed HI 21 cm emission line spectra: Application to the DRAO Deep Field from DHIGLS and the HI4PI survey*. Minor revisions complete, awaiting acceptance. (“The paper is well-written and contains novel results that are certainly worthy of publication in ApJ.”)

Team Draco. *The atomic-to-molecular transition in a colliding flow: analysis of CO and HI observations of the Draco nebula*

Besson, J. et al., *ROHSA-GPU: Performance improvements using graphics processing units (GPUs) - Application to phase separation of the Low Latitude Intermediate-Velocity Arch I toward Ursa Major*

#### **Dragonfly.**

Bowes, S, and Martin, P. G. *Diagnostics from polarization of scattered light from cirrus*

#### **Gaia.**

Campbell, J. L. and Martin, P. G., *Red Stellar Populations and Dust Extinction toward the W3 Giant Molecular Cloud*. 47 pp manuscript from her PhD thesis.

## **D. Teaching**

### *12a. Recent Undergraduate Activities*

*AST 425Y*: 4th year astrophysics individual studies for program specialists. Except for the three most recent, who are in graduate school, the rest have completed their Ph. D. In 2020-21 Luka Vujeva, on structure formation in intermediate velocity clouds. In 2014-15 Jessica Campbell and Ayushi Singh, both now in graduate school at UofT. In 2012-13 Hans Nguyen, on the structure of a star forming GMC. In 2006-7 M. Rahman who investigated massive star formation using optical and infrared data. In 2005-6 K. Bandara who on analysed some bright high-mass protostars in one of our BLAST Galactic plane fields.

*PHY 478S*: Senior capstone research course. In 2020 Mark Lamorena carried out analysis of HI spectra to reveal thermal phases in compact high velocity clouds. This worked out well despite COVID.

*CTA 395Y*: This was a new research-experience course in CITA in 2013-14. I had two students, Jessica Campbell and Ryan Cloutier, who both accomplished a lot toward publications (pending). Both are now in graduate school at UofT.

*AST 101 and AST 201*: I have not actually taught these courses but I invested a lot of effort into planning their migration to Convocation Hall (to meet the ever-expanding demand for these courses). Providing for an enhanced experience in (despite) this large-lecture-hall setting required attention to both pedagogical research on effective learning and use of new technology. We have a lot of visual images, simulations, and animations to present in the most effective way, in concert with a curriculum that we continue to evolve. An excellent start in presenting these courses was made in 2003-04 and an outstanding teaching award was earned in 2004-05. We have introduced interactivity to fully engage the students and, hope through new control technology, promote immersive access to rich media. In addition we have reintroduced tutorial/lab sessions, despite the enrolment growth to 1500 students in each of 101 and 201. Small group sessions in our new planetarium were added in 2010.

### *12b. Recent Graduate Activities*

*AST 1500Y and AST1501Y*: These are aimed at teaching the equivalent of a lecture course, where the student learns through actual research in that sub-field with one-on-one supervision. I have had a regular stream of students, who are now doing advanced work for their Ph. D.

*Ph. D. General Examination and Qualifying Examination*

I participate regularly in these candidacy examinations of Ph. D. students in the Department of Astronomy and Astrophysics.

*Ph. D. Thesis Committees*

I am typically on several of these committees, which mentor and monitor the progress of students in the Department of Astronomy and Astrophysics.

*12a-b. Outside the Box*

*Planetarium:* We submitted a CRIF proposal to install a modern interactive planetarium to enhance the student experience in all of our undergraduate courses. This was successful and with additional funding from the Dunlap Institute the planetarium was installed in summer 2010. In 2010–11 we added planetarium sessions for all of our undergraduates, now serving more than 3000 students. The planetarium has also become a popular feature of our public outreach, since 2012 offering programs to schools and other groups.

To meet the need, we are planning as much larger fixed-dome planetarium for the New Astronomy Building. In the meantime, a new fixed-dome facility is being studied both as a planetarium and for cross-disciplinary scientific visualization.

*Professional Development:* In each of 2013 and 2014 I sent seven students and postdocs to the Inquiry Institute, Professional Development Program of The Institute for Scientist & Engineer Educators (<http://isee.ucsc.edu>). We hosted the complementary Design Institute in Toronto. We became a formal partner of the acclaimed ISEE program.

*West African International Summer School for Young Astronomers (WAISSYA):* In October 2013 four of our graduate students and postdocs collaborated with Nigeria’s National Space Research and Development Agency’s Center for Basic Space Science to present the inaugural week-long school for over 50 undergraduate students from Nigeria, Senegal, and Ghana in Abuja, Nigeria. As we described at the time, “*The school provided science and engineering students in West Africa with basic astronomical instruction which they do not currently receive. It was designed to enhance science instruction at the undergraduate level; it also encourages and supports students in continuing to study astronomy at the graduate level. In addition, a goal of the school was to better equip secondary and primary school science teachers in West Africa to teach astronomy.*” A second version was held in July 2015 in Nigeria, with support from the International Astronomical Union. With growing diverse support a third version was held in July 2017 in Ghana. A participant in the first school is now in our graduate program at UofT and she helped lead the third school.

*Summer Schools:* I was on the organizing committee (curriculum) for the Dunlap International Summer Schools: “*Introduction to Astronomical Instrumentation: First Light on the Decades Most Innovative Instruments*” held August 2014, and “*Introduction to Astronomical Instrumentation: Tools and Techniques for Pioneering Astronomers*” held August 2013.

I lectured on star formation research with the Herschel Space Observatory at a summer school for graduate students (largely Canadian), a one week event in Victoria in August 2006.

*Summer Undergraduate Research Program:* One area of focus benefiting from the professional development program has been to enhance the summer undergraduate research program with activities beyond individual research, such as lectures, current literature discussion sessions, and opportunities to present results of research. This brings together the many participating undergraduates into a cohesive cohort and exposes them to a much broader range of research. We have expanded this program to include all students in the astro units DAA, Dunlap, and CITA. I personally supervise one student each summer.

*Museum Studies:* I made arrangements for masters students in the Museum Studies Program to create an exhibit of past and present Dunlap instrumentation, with mentoring by Dunlap scientists. This exhibit was on display at IHPST, Victoria College, for six months in 2013.

*Research School in Alexandria:* I presented a series of lectures over two weeks at the Bibliotheca Alexandrina in Egypt in Spring 2006. The goal was “*to expose young scientists to major astronomical themes and to show them how material they learn in the university enables them to participate in cutting edge astronomical research.*” We had students from Egypt, Lebanon, Morocco, France, Greece, and India. I was of some assistance to the organizer Amr El Zant in the planning of this event.

12c. *Research Supervised*

## Postdoctoral Fellows and Research Associates

A. Boothroyd	Regions of Star Formation	1986-88
A. Chang	Regions of Star Formation	1986-88
T. Hasegawa	Regions of Star Formation	1986-88
A. Noriega-Crespo	Regions of Star Formation	1986-88
P. Barnes	Regions of Star Formation	1988-90
A. Raga	Regions of Star Formation	1988-90
S. Terebey	Regions of Star Formation	1989
W. Keogh	Collisions of H <sub>2</sub> with D, He, and H <sub>2</sub>	1992-93
F. Rouleau	Electromagnetic Scattering	1993
A. Boothroyd	Potential Energy Surfaces Involving H <sub>2</sub>	1994-95
S.-H. Kim	Interstellar Dust	1995
J. Tsai	Galactic Ecology	1994-96
D. Johnstone	Galactic Ecology	1996-99
S. Basu	Star Formation	1996-99
A. Lazarian	Interstellar Medium	1998-99
P. van Hoof	Nebulae	1998-01
J. Weingartner	Galactic Ecology	1999-03
M.-A. Miville-Deschênes	Interstellar Medium	2002-04
A. Boothroyd	VGPS, GBT surveys	2004-12
J. Fischera	Evolution of Dust (Herschel)	2006-9
K. France	Photodissociation Regions (Herschel)	2006-7
K. Blagrove	North Ecliptic Pole Survey (Planck)	2006-16
M. Compiègne	Evolution of Dust	2007-10
A. Roy	Herschel Star Formation	2011-12
J. Fischera	Physical Properties of Filaments	2011-13
M. Montera-Castano	Herschel Interstellar Medium	2012-14
T. Hoang	Polarization of Dust Emission	2012-16
Q. Nguyen Luong	Herschel Star Formation	2012-15
R. Friesen	Filaments and Cores in Molecular Clouds	2013-17
D. Pinheiro Goncalves	High Latitude Cirrus	2014-15
N. Gandilo	Wavelength Dependence of Submillimetre Polarization	2015-16
J. Shariff	Wavelength Dependence of Submillimetre Polarization	2018-19
A. Roy	Dust opacity and extinction	2018-19
A. Marchal	Thermal phase transitions in atomic gas	2019-22

## Ph. D. Students

B. Everson	1979	Mass Transfer in Close Binary Systems	1972-79
J. Maza	1979	Polarization of Seyfert Galaxies and Related Objects	1975-79
C. Rogers	1981	Radiative Transfer in Spherical Geometry with an Anisotropic Phase Function	1977-81
G. Clayton	1983	Interstellar Dust in the Large Magellanic Cloud	1979-83
M. Mandy	1991	Molecular Dynamics of the H + H <sub>2</sub> System	1988-90
F. Rouleau	1992	Shape and Clustering Effects on the Extinction of Light by Amorphous Carbon Grains	1987-92
W. Keogh	1992	Analytical Representations of the H <sub>3</sub> and H <sub>4</sub> Potential Energy Surfaces (with A. Boothroyd)	1989-92
S.-H. Kim	1994	On the Evolution of the Mass Distribution of Interstellar Dust Grains	1991-94
C. Kerton	1999	A Multiwavelength Study of Dust Associated with H II Regions and their Environs	1996-99
E. Verner	1999	[Fe II] in H II Regions	1998-99
J. Karr	2002	Triggered Star Formation	1999-02
K. Blagrove	2006	Orion Nebula from UV to IR	2000-06
P. Ehlers (with Netterfield)	–	Cold Galactic Dust (Boomerang)	2002-06
T. Rothwell	–	MHD Simulation of Interstellar Shells	2003-04
E. Pasquale (with Netterfield)	2007	BLAST on HVCs	2005-7
D. Wiebe (with Netterfield)	2008	BLAST on Star Formation	2005-8
D. Pinheiro Goncalves	2013	High Latitude Cirrus (Planck)	2006-13
A. Roy	2011	Star Formation in Cygnus X (BLAST)	2007-11
A. Rivera-Ingraham	2012	Early Star Formation in W3 (Herschel)	2009-12
E. Saury (with Miville-Deschenes)	2012	Simulations of H I Turbulence	2010-12
J. Soler (with Netterfield)	2013	Magnetic Fields and Filaments	2012-13
J. Zhang (with Abraham)	2018	Dragonfly Galactic Cirrus	2013-18
A. Singh (with Matzner)	2022	Properties and Stability of Gould Belt Star Forming Regions: Observational and Theoretical Analyses	2015-22
J. Campbell (with Gaensler)	2023	A Multi-Frequency Perspective on Galactic Magnetism and Dust Extinction	2021-23
Q. Liu (with Abraham)		Scattered light with Dragonfly	2019-

## M. Sc. Students

S. Alers	1977	Optics for Polarimetry	1975-77
R. Rusk	1981	The DDO Reticon System	1980-81
A. Rusk	1983	A Study of the Dissociation of Molecular Hydrogen in Interstellar Shocks (with Dove, Chemistry)	1980-83
C. Westbury	1986	An Approximate Method for the Calculation of Effective Recombination Coefficients	1985-86
M. Richer	1989	Neutral Oxygen in Planetary Nebulae: – Probing Radiative Transfer and Nebular Structure	1988-89
S.-H. Kim	1991	Numerical Simulations of Time-dependent Stellar Jets (nominal, with A. Raga)	1989-91
D. Schwarz	1991	The Cooling Function for H <sub>2</sub>	1990-91
D. Ballantyne	1999	Protoplanetary Disks (nominal, with D. Johnstone)	1998-99
K. Blagrove	2000	Faint Lines in the Orion Nebula	1999-00
T. Rothwell	2001	Continuum Sources in the VGPS	2000-01

## M. Sc. level international interns

G. Stephan, U Paris XI	2012	Power Spectra of H I Column Density	2011-12
J. Besson, CentraleSupélec Paris	2021	GPU speedup of spectral decomposition	2021
J. Sternberg, ENS Paris	2022	CO in the Draco Nebula	2022
L. Vujeva, U Copenhagen	2022	HI in the Draco Nebula	2022

## Senior Undergraduates

C. Rogers	Scattering by Spheroids	1975-76
D. Guiguere	H I and IRAS Observations	1993-94
D. Ballantyne	Multi-frequency Study of KR 140 (Co-op)	1996
D. Samoylof	Nebular Astrophysics with CLOUDY	1997-98
K. Bandara	BLAST High Mass Protostars	2005-06
M. Rahman	High Mass Star Formation in Perseus	2006-07
H. Nguyen	The RCW106 GMC	2012-13
J. Campbell	Spectral Signature of Collapsing Cores	2013-14
R. Cloutier	Dragonfly Observations of Cirrus	2013-14
A. Nguyen	Star formation in the Cepheus Flare	2014
A. Singh	Filamentary Structure in Serpens	2014-15
J. Campbell	Massive Cold Cores in W3	2014-15
M. Lamorena	High Velocity Clouds	2020
L. Vujeva	Intermediate Velocity Clouds	2020-21

## NSERC and other Summer Students

A. Dickson	1989	Spectral Line Observations of Orion B (with P. Barnes)
M. Lister	1990	Spectral Line Observations of Orion B (with P. Barnes)
A. Brown	1994	Collisionally Induced Dissociation of H <sub>2</sub> by H <sub>2</sub>
G. Young	1995	Collisional Excitation of H <sub>2</sub> by H <sub>2</sub>
A. Shen	2004	Hydrodynamical Evolution of the Orion Nebula
A. Hou	2007	BLAST Power Spectra
L. Einstein	2007	Highly Reddened Stars in W3
H. Nguyen	2013	CO from ThrUMMS
R. Cloutier	2014	Scattered Light Nebula in Draco
A. Singh	2014	Molecular Cloud Structure and Star formation
N. Price-Jones	2015	Scattering and Thermal Emission from Dust
J. Campbell	2016	Multiwavelength Photometry of Bright Infrared Stars
S. Song	2018	New insights in the interstellar medium using Gaia
M. Taank	2020	Thermal phase transitions in the Spider HI complex
M. Taank	2021	Gas and dust in the Galactic fountain
L. Vujeva	2021	Gas and dust in the Galactic fountain
S. Bowes	2022	Optical polarization of high latitude cirrus
P. Sharma	2022	HI, CO, and dust in the Draco Nebula
G. Govindaraj	2023	Anisotropic illumination of the Gould Belt molecular clouds

## Recent Administrative Positions and Professional Duties

### *University of Toronto*

Current and Recent (reverse chronological to 2015)

Associate Director, CITA, 2022–

Proposal to establish the *School of Cosmic Future*, 2020–

Search committees for CITA faculty members, 2021–23

Faculty of Arts and Science Council, 2020–2021, 2021–22, 2022–23

Tri-Campus Decanal Promotions Committee, 2018–2019, 2019–2020, 2020–2021

Committee for international search for the Director of CITA, 2019–2021

Search committee, Chair of Astronomy and Astrophysics, 2019–2020

Search committee, Sutton Family Chair, St. Michael's College and Astronomy and Astrophysics, 2019–2020

Preparation of a proposal for a Canada Excellence Research Chair (CERC) in the Gravity of Fundamental Astrophysics Research (GoFAR), phase 2 nomination (approved March 2019)

Search committee for the candidate for GoFAR CERC, 2018 – 2020

Preparation of a proposal for GoFAR CERC, 2017 (1of 11 approved nationally, only one in basic research)

Investigated and solicited private funding for WAISSYA school in West Africa; planned school in Ghana for 2017

Massey Refugee Support Initiative, advisor to student-led initiative that brought a Syrian refugee to Toronto, 2016

Provostial representative on OISE decanal promotion committee, 2015–17

Graduate admissions committee, Astronomy and Astrophysics, 2015-17

Planning and consultation for the new Astronomy building and planetarium, 2015–

SGS-appointed Chairman, Ph.D. oral examinations, 1980–

Previous (chronological, only 1989–)

Vice-Presidential Task Force on Large Scale Computing, 1989

Parallel Computing Facility Vice-Presidential Task Group, 1990

Connaught Physical Sciences Review Panel, 1989-92

Five-year review of CITA, 1995-96

Computing Czar, CITA, 1984–99

Provostial Assessor, 1988–97

Awards Committee, Department of Astronomy and Astrophysics, 1994–99

Academic Advisory Committee of the Computing Management Board, 1995–01

Visitor Czar, CITA, 1996–99

Awards Committee, Math and Physics Class of '30 Scholarship, 1996–99

University Tribunal on Academic Offences, 1998–01

Raising our Sights Planning Committee, Department of Physics, 1999

Organizer, Wiegand Lectures, 2000

Organizer, Hogg Distinguished Visitorship, 2001

Presidential committee to review portfolio of Vice-President, Research and International Relations, 2002

Internal adjudication committee for CFI applications, GRIP, 2003

Dean's merit committee, 2003–05

Member of the Corporation, Massey College, 2003–13

Budget advisory committee, Faculty of Arts and Science, 2004–5

Organizer, Hogg Distinguished Visitorship, 2005

Advisor, Cosmic Frontiers Lecture Series, 2005

Advisory Committee for High Performance Computing and now SciNet, 2004–8

Graduate Admission Committee, Department of Astronomy and Astrophysics, 1989–2010

Academic Standards, General Committee, and Faculty Council of the Faculty of Arts and Science, 1999–2010

Faculty Advisor, Astronomy and Space Exploration Society, 2003–2010

Graduate Education Council, 2007–10

Co-chair, University of Toronto Space Program, 2008–12  
 Committee for international search for the Director of the Dunlap Institute, 2009  
 Vice-Presidential Committee to revise the Connaught Programs, 2010  
 Presidential Advisory Committee on the appointment of the Vice-President Business Affairs, 2011-12  
 Vice-Presidential Committee on Major Awards, 2011–12  
 Search committees for CITA faculty member and Outreach Officer, 2012–13  
 Search committees for DAA/Dunlap faculty member and Lecturer, 2012–13  
 Search committee, Chair of Chemistry, 2012–13  
 Selection of Centre for Planetary Science postdoctoral fellows, 2013–14  
 Selection of Dunlap Fellows (postdoctoral fellows), 2012–2016  
 SGS decanal representative on tenure committees, 2013 & 2015–7  
 Search committee for DAA faculty member, 2013–14  
 Committee for international search for the Director of the Dunlap Institute, 2013–15  
 Search committee for the 5th Master of Massey College, 2013  
 Originator and Organizer, Dunlap Prize, 2014  
 CFI IF Review College, 2014, 2016

*Outside the University*

Current and Recent (reverse chronological to 2013)  
 NIRCam Science Team, James Webb Space Telescope, 2002–  
 SDSS V: Galactic science 2021 –  
 Editorial Board, Planck satellite, ESA, 2012–20  
 Core Science Team, Planck satellite, ESA, 2011–20  
 Co-coordinator, Planck WG7 Galactic and solar system science, Planck collaboration, 2011–16  
 BLAST-TNG Science Team, 2011–20  
 Scientific Organizing Committee, Focus Meeting 5, Planck Science, IAU GA 2015, Honolulu, HI  
 Scientific Organizing Committee, Planck 2014: The microwave sky in temperature and polarization, Ferrara, IT  
 Joint Committee (of the Canadian Astronomical Society and the Canadian Space Agency) for Space Astronomy, 2013–15  
 BLASTpol Science Team, 2009–19  
 Herschel-Planck Cold Cores Open Time Key Project (proposing team), 2007–18  
 Management Committee, DRAO Planck Deep Fields, 2005–2017  
 JCMT Galactic Plane Survey (proposing team), James Clerk Maxwell Telescope, 2005–2017  
 Hi-GAL Steering Committee, Herschel Space Observatory, 2004–2016  
 SPIRE Science Team, Herschel Space Observatory, 2003–2018  
 Consultant/advisor/committees, TMT, 30-m Telescope project, 2002–19  
 HIFI Science Team, Herschel Space Observatory, 2002–15  
 Member, Commission J (radio astronomy) of URSI (Union Radio-Scientifique Internationale), 2000–  
 College of Reviewers, Canada Research Chairs, 2000–  
  
 Previous (chronological, only 1989–)  
 Board of Directors of the Canadian Astronomical Society, 1986-89 (Chair, Awards Ctte.)  
 FCAR Review Committee for the Observatoire du Mont Mégantic, 1989  
 NASA Review Panel for Long-Term Space Astrophysics, 1990  
 Scientific Organizing Committee, The First Symposium on the Infrared Cirrus and Diffuse Interstellar Clouds, 1993  
 Scientific Organizing Committee, Diffuse Interstellar Bands, May 1994  
 Scientific Organizing Committee, IAU Joint Discussion on Dust in Circumstellar Disks, August 1994  
 Management Committee, Canadian Galactic Plane Survey, 1994–2001  
 Scientific Organizing Committee, Polarimetry of the Interstellar Medium, June 1995  
 Canadian Time Assignment Committee, Canada-France-Hawaii Telescope, 1995

Scientific Organizing Committee, Summer School on the Interstellar Medium (Naramata), 1996  
 Advisory Board, Herzberg Institute of Astrophysics, National Research Council of Canada, 1993-96  
 Scientific Organizing Committee, Commission 34 (Interstellar Matter), International Astronomical Union, 1991-97  
 Scientific Organizing Committee, International Meeting on Galactic Ecology (Naramata), 1998  
 Chair, CITA High Performance Computing Consortium, 1995-00  
 Users' Committee, Dominion Radio Astrophysical Observatory, 1995-00 (Chair 1998)  
 Chair, Joint Committee (of the Canadian Astronomical Society and the Canadian Space Agency) for Space Astronomy, 1999-2002  
 Associate Investigator, Planck satellite, ESA, 2000-2011  
 Scientific Organizing Committee, 21-cm H I Surveys of the Milky Way, US National Radio Astronomy Observatory, 2001  
 Herschel Space Observatory HIFI Band 6 Board Review, NASA, 2001  
 Canadian Gemini (Telescope) Science Steering Committee, 2001-05  
 Management Committee, International Galactic Plane Survey, 2001-12  
 Founding advisor, Association of Canadian Universities for Research in Astronomy, 2002-03  
 Advisory Board of the Herzberg Institute of Astrophysics, 2002-05  
 MIPS Science Team, Guaranteed Time Observations, the Spitzer Space Telescope, 2002-05  
 Time allocation committee, Hubble Space Telescope, 2003  
 Vice-President, Canadian Astronomical Society, 2003-06  
 Consultant/advisor, Mid-Term Review of the Canadian Long Range Plan for Astronomy, 2004  
 Canadian ALMA Science Steering Committee, 2004-05  
 NSERC Grant Selection Committee 17 (Space and Astronomy), 2004-07  
 Panel chair and Time Allocation Committee, Spitzer Space Telescope, 2005  
 Organizer, International Galactic Plane Survey annual science meeting, UofT, 2005  
 Chair, Town Hall Meeting, Canadian Space Agency, 2005  
 Scientific Organizing Committee, Sky polarisation at far-infrared to radio wavelengths: the Galactic screen in front of the Cosmic Microwave Background, IAS, Paris, 2005  
 Co-chair, Coalition for Canadian Astronomy, 2005-08  
 Scientific Organizing Committee, Canadian Space Astronomy Workshop, Montreal, 2006  
 President, Canadian Astronomical Society, 2006-08  
 Chair, Canadian National Committee of the International Astronomical Union, 2006-08  
 Ad-hoc Advisory Committee, proposed Research Centre at Bibliotheca Alexandrina, 2006-07  
 MIPS GAL Science Team, Spitzer Space Telescope, 2006-12  
 Scientific Organizing Committee, The evolving interstellar medium, Pasadena, 2007  
 MUSTANG Science Team, GBT, 2007-09  
 Visiting Committee, Computation and Information Technology, Institute for Advance Study, Princeton, 2009  
 Scientific Organizing Committee, Annual Symposium (dedicated this time to Astronomy), Royal Society of Canada, 2009  
 Past-President, Canadian Astronomical Society, 2008-2010  
 University of Toronto representative, Association of Universities for Research in Astronomy. 2008-10  
 Scientific Organizing Committee, Astrophysics from the radio to submillimetre Planck and other experiments in temperature and polarization, Bologna, February 2012  
 Scientific Organizing Committee, MW2011 The Milky Way In The Herschel Era: Towards A Galaxy-Scale View Of The Star Formation Life-Cycle, Rome, September 2011  
 Assessor, CIFAR workshop on Astrobiology, February 2012  
 External reviewer of Physics Department undergraduate program, University of Waterloo, 2013  
 Scientific Organizing Committee, Exploiting the Herschel and Planck data, Paris, April 2013

## E. Other

### a. Outreach

Over the years I have made various contributions (notice how technology changes) relating to this important aspect of my position, including: consulting for Moreland-Latchford on filmstrip series for elementary schools; audio-visual (slide/tape) shows for the Science Open Houses at Scarborough College; speaking to the Toronto Centre of the RASC; lecturing in the “Astronomy Now” series at University of Cambridge; appearing on television in Toronto through OECA; being interviewed on BBC radio; designing display cases in the McLennan Physical Laboratories and at Scarborough College; lecturing to the Royal Canadian Institute; lecturing in the Ontario government sponsored “In Search of Learning” series; arranging a major public lecture on SETI; preparing material from the Canadian Galactic Plane Survey for the Ontario Science Centre; lecturing to the Senior Alumni; arranging the Wiegand Lecture Series for the Faculty of Arts and Science; lecturing to gifted students of the TCDSB; lecturing to local and regional amateur astronomy associations; tours of the DDO; and judging at the Toronto-Wide Science Fairs. I have had discussions with a publisher on a popular book which I am developing (but never completing!). I have led an Elderhostel week on Cosmology. My pictures of a planet “alignment” are on [http://www.cita.utoronto.ca/\[tilde goes here\]pgmartin/alignment](http://www.cita.utoronto.ca/[tilde goes here]pgmartin/alignment). I had a booth at the Mining in Society show at the MTCC, showing hundreds of visitor the oldest rocks in the solar system and explaining the origin of the elements. I led a Science Round Table and spoke at a Senior Fellows’ Lunch at Massey College. I participated in a video for Herschel Space Observatory. I hosted a Breakfast with the Bulletin event and spoke to the King’s College Circle Heritage Society.

In the past many years I have worked with the AstroGrad Network (alumni of our undergrad program) and been a faculty mentor for the student Astronomy and Space Exploration Society. I supported enhancements to our visitor programs at our St. George Observatories, and for Earth Day, Astronomy Day, Science Rendezvous, and Nuit Blanche.

Through the Dunlap Institute I supported the CoolCosmos campaign on the TTC (and web) and other events during the Internaitonal Year of Astronomy, and established a unique Science Journalist in Residence program (held by Ivan Semeniuk). I wrote, developed, and presented a visual program for the day-long kickoff of the International Year of Astronomy at the Ontario Science Centre. I championed the importance of our new planetarium. I explored initiatives with Outward Bound and the TDSB re programming at the Brickworks, aimed at disadvantaged youth

I worked to bring a modern digital Planetarium to campus and promoted its use in outreach as well as a teaching facility. As Acting Vice-Dean in Arts and Science I forged new links with student coordinators of Let’s Talk Science. I gave an invited lecture at the 2012 annual meeting of the AAAS.

In June 2012 I was a sidewalk presenter at the Transit of Venus event. I issued a press release (2013) under the titles “How to Build a Very Large Star” and “Hunting Massive Stars with Herschel” which got wide circulation round the world. I committed the Dunlap Institute as a founding and lead partner to develop the Toronto Science Festival and supported its launch in September 2013 with staff and resources. I was involved in promoting and planning a week-long school for undergraduates in West Africa (October 2013, repeated in 2015, 2017).

I originated and made the arrangements for the Dunlap Prize awarded to Dr. Neil deGrasse Tyson, March 2014. I have supported the Toronto Centre of the Royal Astronomical Society of Canada in their education and outreach efforts at the David Dunlap Observatory. I worked with a group proposing to the Town of Richmond Hill to operate education and outreach public programs at the David Dunlap Observatory. I continue to give talks to amateur astronomical societies in southern Ontario.

### **Documentary: Star Men**

I consulted on the science narrative and content flow for this acclaimed feature-length documentary by Alison Rose and then again on its accompanying interactive web site published in 2018. “*Enormous charm and food for thought*” said The Guardian. See much more at <http://www.starmen.space>.

### **Art: Mystical Landscapes**

Under Katharine Lochnan, senior curator, I worked for several years on the Advisory Committee for Mystical Landscapes: Masterpieces from Monet, van Gogh and more, the joint exhibition that set attendance records at the AGO and Musee dOrsay in 2016-2017. “*A feast for the senses and the soul*” said The Globe and Mail. See <https://www.ago.net/mystical-landscapes> and (search) Au-delà des étoiles. Le paysage mystique de Monet à Kandinsky.

- Wrote an intervention on the cosmos for the scholarly catalogue for Mystical Landscapes that won the Canadian Museums Associations Award of Outstanding Achievement in Research - Art for 2017.
- Arranged that the Planetarium be deployed at the AGO for several weeks over the Christmas break in conjunction with Mystical Landscapes. Sold out.
- Massey Round Table, panel discussion on Mystical Landscapes
- Presented “*Immersed in the cosmos: the astronomical sublime*” as a featured speaker in Chris Hadfield’s Generator: The Mystic North, held in Baillie Court at the AGO, 2 Nov 2016.  
<https://www.ago.net/chris-hadfields-generator-the-mystic-north>

### *b. Expert Refereeing and Reviews*

A considerable effort is spent as a referee for the journals *Astrophysical Journal*, *Monthly Notices of the Royal Astronomical Society*, *Astronomical Journal*, *Astronomy and Astrophysics* and *Nature*. In addition to a critique I often write extensive constructive comments which I feel would enhance the impact of the papers. Generally I waive my anonymity. While a lot of this work goes unrewarded in any concrete sense, there is an appreciation for good refereeing, and I have received many letters of appreciation.

I review regularly research grant applications to NSERC, the Killam Foundation, Canada Research Chairs, Canadian Foundation for Innovation, the NSF (USA), NASA, PPARC (UK), the Netherlands Foundation for Astronomy, and the Swiss Supercomputing Centre and observing time requests to the Canada-France-Hawaii Telescope, Gemini, and the James Clerk Maxwell Telescope.

I have served on a Selection Panel for observations with the Hubble Space Telescope, the Time Assignment Committee for Spitzer Space Telescope, and NSERC Grant Selection Committee 17 for Space and Astronomy.

I carry out program reviews in physics and astronomy at other universities, recently McMaster and Waterloo.

I am also asked to write many letters re promotions, fellowships, prizes, honorary degrees (e.g., Caltech, Cornell, Manchester, McMaster, Royal Society Leverhulme Trust, Royal Netherlands Academy of Arts and Sciences, Schmidt Foundation, Western).

## F. EXTRACURRICULAR: as in “life beyond the office”

*Music.* Pre-COVID, I played violin in the Hart House Symphony Orchestra (four concerts here at UofT every year and one benefit concert on the road).

I was the sole liaison with staff at **Carnegie Hall** over 10 months, with the PLAYBILL staff, and with Warden J. Monahan of Hart House to arrange our concert in NYC, 19 February 2017. See (or type in/search) <https://www.carnegiehall.org/Calendar/2017/02/19/HART-HOUSE-ORCHESTRA-UNIVERSITY-OF-TORONTO-0300PM>. I managed a budget that both covered costs and resulted in \$18K for a legacy fund for the orchestra.

Most recently, this fund has facilitated a tour to **Germany** in April-May 2019, with concerts in Dusseldorf, Gottingen, and Tübingen.

*Climate change.* In connection with the Walter Gordon Symposium on Public Policy 2015 organized by students at Massey College and SPPG I wrote an essay for The Globe and Mail (republished in the UofT News): see (or type in/search)

<https://www.theglobeandmail.com/opinion/to-confront-climate-change-we-must-turn-fear-into-empathy/article23594562/>

I continue to work with members of the broader UofT community to encourage divestment from fossil fuels as an effective tool among efforts to combat climate change and the resulting worldwide social injury. We need to make progress soon. I am also promoting climate-related actions with Canadian Astronomical Society and the International Astronomical Union.

*Off-track.* I eagerly await warmer water/weather every year to sail, canoe, and kayak– if not off on my motor-bike! In the off-season I skate and ski.

*Home front.* I have the pleasure of helping my spouse Camie mount shows of her bronze sculpture, and also doing practical work in her studio (<http://camie.ca>). Together our four children have earned nine degrees at UofT, with at least two more to come. Now, all of a sudden, we have six grandchildren to enjoy. I am trying to teach them all a full suite of building trades, which I feel fortunate to have learned from my father.

**END**