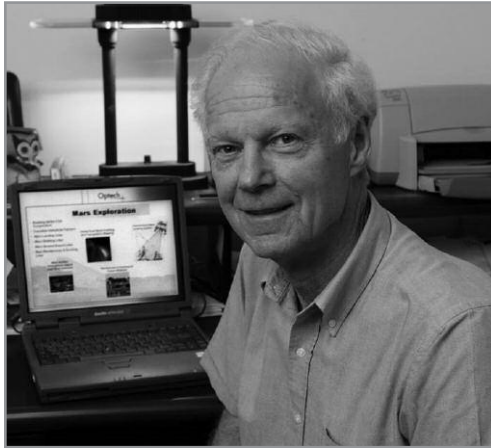
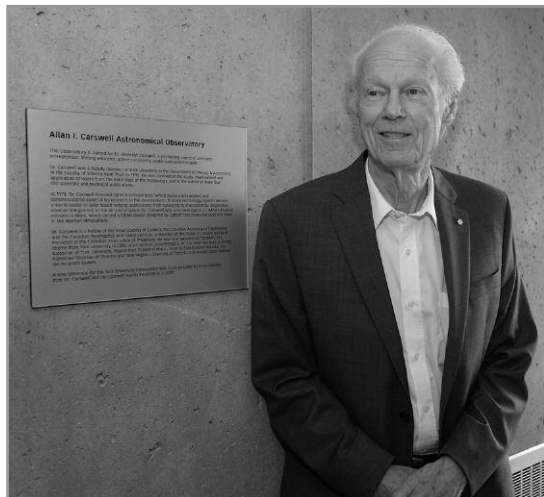


MORE ABOUT THE AUTHOR

PHOTO: David Cooper, Toronto Star



2005, Allan in the lab preparing for the *Phoenix* mission to Mars



2019, Allan at the opening of the Allan I. Carswell Astronomical Observatory at York University



January 22, 2021

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Allan I. Carswell, C.M., O.Ont., P.ENG
Email: allan@cyoo.ca

Dear Dr. Carswell,

On behalf of York University, I wish to extend my congratulations on your appointment to the Order of Ontario, the province's highest honour. Through your many achievements, you have exemplified York's motto, *Tentanda Via: The way must be tried*.

It was my sincere pleasure to support your nomination for this well-deserved honour. The province, the country, and the world have all benefited from your significant contributions to the field of laser-imaging technology and the development of related space instrumentation.

I am also deeply grateful for your innumerable contributions to York, which have supported our university and our students in varied and profound ways.

Congratulations again on this exceptional achievement.

Sincerely,

A handwritten signature in black ink, appearing to read "Rhonda L. Lenton".

Rhonda L. Lenton, PhD
President and Vice-Chancellor



Professor Emeritus Allan Carswell appointed to Order of Ontario

POSTED ON 1 JANUARY 2021

Dr. Allan Carswell, Physics Professor Emeritus in the Faculty of Science, has been appointed to the [Order of Ontario](#).

"We wish to congratulate Dr. Carswell on his appointment to the Order of Ontario," says Rui Wang, Dean of the Faculty of Science. "Dr. Carswell has been a tremendous benefactor of York, and particularly of the Faculty of Science, over many years. His leadership and philanthropy – as a physicist, space science innovator, and benefactor of our Observatory, has helped shape our Faculty of Science into the dynamic community it is today, and continues to be an inspiration to us all."

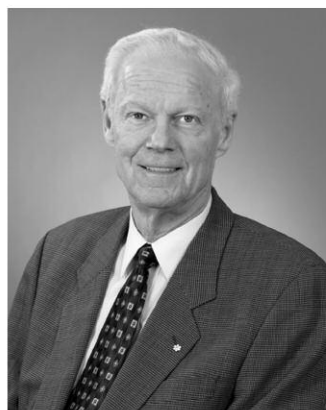
Dr. Carswell joined York University in 1968 as a Professor of Physics, focusing on high-power lasers and developing light detection and ranging (LIDAR) systems for remote sensing and environmental diagnostics. 1974, Dr. Carswell founded [Optech Inc.](#), now Teledyne Optech, to further practical applications of this research. This technology was later deployed by NASA as part of the Mars Phoenix Lander's weather station, led by York scientists.

The legacy of Dr. Carswell's philanthropy on York University's campus, and particularly in the Faculty of Science, is enormous. Dr. Carswell was the driving force behind the establishment of the [Allan I. Carswell Observatory](#) that bears his name, which is home to the largest telescope on a Canadian university campus.

In 2018, Dr. Carswell and the Carswell Family Foundation established the [Allan I. Carswell Chair for the Public Understanding of Astronomy](#), to further science engagement and outreach. These public education activities, particularly those undertaken at the observatory, have helped educate and inspire thousands, both in person and online.

In addition to his philanthropic support, Dr. Carswell has provided invaluable guidance and leadership to science at York.

A news release from the Government of Ontario on the Order of Ontario appointees is available [here](#).





HELEN & ALLAN CARSWELL TAKE CANADA TO MARS (TWICE!)

With the Assistance of the Canadian Space Agency and Innumerable Colleagues

HOW CANADA GOT TO MARS

IT IS INTERESTING IN LIFE TO NOTE HOW APPARENTLY RANDOM AND UNCONNECTED EVENTS, OVER EXTENDED PERIODS OF TIME, CAN LEAD TO TOTALLY UNEXPECTED RESULTS OF EXTREMELY HIGH IMPORTANCE: - AS LONG AS ONE HAS THE INITIATIVE AND COURAGE TO PROCEED.

Events taking Canada to Mars on the NASA Phoenix Mission of 2007

- 1960, Helen and Allan on a Post-Doctoral fellowship in Holland with young family and in urgent need to find a full-time job. Allan had several possible U.S. opportunities but Helen did not want to live in the U.S. so these opportunities were not followed up.
- 1961 Under family pressure, Allan accepts his only firm job offer to work on microwave studies in the RCA Victor Plasma Physics Research Laboratories in Montreal with no experience in either microwaves or plasmas.
- 1960 Laser invented: ruby laser in May, Helium-Neon gas discharge (plasma) laser in December.
- 1961 RCA decided to look into He-Ne laser possibilities, Allan was assigned to initiate laser research with no previous experience. (In 1961 the word "laser" did not even exist. In those early days, there was a large community working with microwave masers and to retain the name recognition they preferred to call the laser devices "optical masers").
- 1961-7, Well settled in Montreal, Allan was leading the First Laser Laboratory in Canadian industry. This lab developed the first commercial lasers produced in Canada.
- 1967 Helen's mother broke her leg while visiting Helen and Allan in Montreal. Helen refused to send her disabled mother back to live alone in Toronto. Family pressure to return to Toronto. Job-Search begins, with offer from the new Science Faculty at York University.
- 1968 York job offer accepted but no lasers, microwaves or plasmas at York (Research at York was on atmospheric studies and space research).
- 1968 Allan changes his research focus by starting a LIDAR Atmospheric Research Program to apply his laser experience in support of the York atmospheric studies, one of the first pioneering lidar programs at that time.
- 1974 Strong lidar user-interest and support leads Helen and Allan in the neophyte "Team Carswell" to establish OPTECH INCORPORATED as a 2-person corporation with Allan looking after the R&D and Helen doing everything else.
- 1974 Helen, as a Registered Nurse, takes a secretarial course to start a new career as a business woman with no previous experience. Optech begins growing steadily to several hundred employees by developing new lidar systems for remote sensing applications.
- 1974 onward: Optech's commercial lidar applications expand significantly focusing initially on atmospheric studies. Ground-based lidar studies of stratospheric ozone lead to development of lidar systems for applications in space. Optech grows and builds an excellent reputation in a range of lidar applications in space.

- **1995 Optech delivers to NASA's Jet Propulsion Lab (JPL) a highly successful engineering model of a Landing Ranging Instrument (LRI), a precision lidar, landing radar for NASA's Deep Space-4 mission.**
- 1999 Based on its leading atmospheric and space lidar capabilities Optech is invited by a University of Arizona/JPL team to join the MITCH proposal, (Mars Investigation of Total Climatological Hazards) to provide a lidar as a Martian Dust Devil Advanced Warning Gizmo (MAD DAWG) for the 2003 NASA Mars Lander Mission.
- 2001 a subset of MITCH instruments was accepted and combined with instruments from a second proposal (ECHOS) in a configuration called MATADOR that was recommended to be the primary science facility on the 2003 NASA Mars lander mission. It was gratifying for the Canadian team to see in the acceptance letter from NASA the Optech LIDAR listed as the "Highest Priority" along with the statement that for "Mars Dust Devil Advanced Warning Gizmo (MAD DAWG) Instrument: The LIDAR instrument contribution by the CANADIAN SPACE AGENCY (CSA) is required (underlining by NASA) for the selection of this instrument".
- 2001 in December the Mars Polar Lander mission was lost and all work on NASA Mars missions was put on hold pending reassessment of the entire Mars Program.
- 2002 However, to not lose the momentum of the teams already scheduled for the 2001 and 2003 missions, the CANADIAN SPACE AGENCY supported Optech lidar activities to "develop a strategy and options for advancing the flight hardware within the scientific scope and capabilities of the lander". This involved field tests in the Arizona desert undertaken with lidar systems already available at Optech. Although the lidars were not optimal for dust devil studies they were suitably modified and excellent data were collected.
- 2002 The focus of the MATADOR work changed abruptly when NASA made an announcement of opportunity under the new SCOUT mission concept for the 2007 Mars mission. This was NASA's SCOUT first fully competed opportunity for scientific missions to the Red Planet. Twenty-five teams assembled and submitted proposals in response to this SCOUT opportunity. Among these was the PHOENIX proposal headed by Peter Smith of the University of Arizona. Although the PHOENIX proposal did not closely mirror the work of MATADOR it did involve a number of the key components and research teams from MATADOR. The focus was no longer on dust and dust devils but on the search for water and "habitable" zones on the surface of Mars where past or present life could exist.
- 2003 with CSA support **Optech joined UofA/JPL proposal to provide a meteorological station with an atmospheric lidar for the NASA 2007 Mars mission PHOENIX.**
- Aug. 4, 2003 the PHOENIX Proposal, including the Canadian meteorological MET station with Lidar, was chosen from the 25 proposals submitted.
- August 4, 2007 PHOENIX was successfully launched to Mars from Cape Canaveral.
- May 25, 2008 PHOENIX landed on Mars and all systems, including MET were operational for the full 5-month duration of this highly successful mission. Mission focus was "Follow the Water" on Mars. CSA's Canadian MET, with Optech's lidar, played a major role by confirming the existence of water and discovering snowfall on Mars, a previously unknown and important component of the Mars hydrological cycle.

"There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune;
Omitted, all the voyage of their life
Is bound in shallows and in miseries.
On such a full sea are we now afloat,
And we must take the current when it serves,
Or lose our ventures."
(Julius Caesar Act 4, Scene 3, 218–22)

METEOROLOGICAL STATION- LIDAR

LOOKING AT MARTIAN CLIMATE AND WEATHER, CANADIAN STYLE

Like a robotic scientist, Phoenix searched for water in the soil, analyzed the chemical and mineralogical makeup of the Mars terrain and studied the atmosphere. Canada's meteorological station (MET) sat on the spacecraft's table-like deck. Using a laser instrument and a suite of temperature, wind and pressure sensors, the MET tracked daily weather patterns and seasonal climate changes on Mars.

Weather Instrument Package: Lidar – A laser weather watcher

Working with Toronto-based Optech, MDA Space Systems of Brampton, Ontario, was the prime contractor for the shoebox-sized Light Detection and Ranging instrument. The lidar's pencil-thick laser shot rapid pulses of light into the atmosphere, which bounced off passing clouds and dust overhead. The pulses of light were then reflected back to a 10-centimetre optical telescope that was part of the lidar system. The data helped to determine the composition, movement, and size of clouds and particles above the lander.

To be able to pierce through most of the thin atmosphere, the laser was fixed in an upward-pointing orientation and worked at two wavelengths so that it could give accurate measurements of cloud height to within 10 metres. The Canadian science team typically ran the laser for 15-minute periods four times daily in order to determine what time of day clouds began to form around the landing site, and to find out if clouds form at various altitudes at certain times of the day. Though it only required the power of a 30-watt light bulb the lidar could shoot 20 kilometres high into the Martian atmosphere.


By scanning and probing the Martian polar sky in such detail from the ground for the first time, Canadian

researchers saw a variety of atmospheric activity in greater detail than ever before. They looked at ice and dust clouds, ground fog, and even saw dust devils across the landing site. Researchers are using this unique data from the Red Planet's polar region to create a clearer picture of how water cycles between surface ice and vapour in the atmosphere. The Phoenix Mars Lander was the first mission to explore the Arctic region of Mars at ground level. Phoenix was launched from the Kennedy Space Centre aboard a Delta II rocket at 5:26 a.m. EDT on August 4, 2007. It landed near Mars' northern polar cap on May 25, 2008 in an area known as Vastitas Borealis, where it continued to operate successfully for more than five months (far beyond its planned 90-day mission).

The Phoenix Mission marked the first time that Canada, as a nation, landed on the surface of Mars. Canada's meteorological station recorded the daily weather at the landing site. It measured Mars' temperature and pressure, and probed clouds, fog and dust in Mars' lower atmosphere. Most significantly, the weather station lidar confirmed that it snows on Mars by detecting snowflakes falling from clouds about 4 kilometers above the spacecraft's landing site.



**Simulation of the Canadian lidar instrument in operation. (Credit: NASA Jet Propulsion Laboratory, University of Arizona)*



MESSAGES FROM EARTH
*Phoenix Mission to Mars
 Participation Certificate*
 Presented To
Helen Alexandra Carswell
 ON
 October 31, 2006


Thank you for joining us on *Phoenix*, the first lander to explore the Martian arctic. Your name is included on a silica mini-DVD provided by The Planetary Society, the world's largest space interest group, along with *Visions of Mars*, a collection of some of the greatest works of literature and art about the Red Planet.

Your name etched on this archival disc is now a permanent record of your participation in the story of space exploration.

Peter Smith
 Phoenix Principal Investigator
 University of Arizona

Louis D. Friedman
 Executive Director
 The Planetary Society

The Phoenix Mission has project management at NASA's Jet Propulsion Laboratory and a development partnership with Lockheed Martin Space Systems and Lockheed Martin Space Research Company. Involvement from the University of Arizona is provided by the Center for Space Systems, the University of Tennessee (Knoxville), the University of Georgia, and the Ohio State University in Columbus.



MESSAGES FROM EARTH
*Phoenix Mission to Mars
 Participation Certificate*
 Presented To
Allan Ian Carswell
 ON
 October 31, 2006

Thank you for joining us on *Phoenix*, the first lander to explore the Martian arctic. Your name is included on a silica mini-DVD provided by The Planetary Society, the world's largest space interest group, along with *Visions of Mars*, a collection of some of the greatest works of literature and art about the Red Planet.

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