Peter E. Dewdney Brief Biography

Education:

Undergraduate degree in Engineering Physics, University of British Columbia (UBC), 1968. MASc, University of British Columbia in 1970. PhD in Electrical Engineering at UBC, 1978.

Description:

Following his PhD project building an Earth rotation radio telescope at a (low) frequency of 22 MHz, he began a research career as a Research Officer with the National Research Council of Canada's (NRC) Dominion Radio Astrophysical Observatory (DRAO), which went from the mid-1970s until 2008. During that long period, his interests and activities evolved and changed several times, crossing back and forth between the science and technical sides of radio astronomy.

From the late 1970s into the early 1990s, he carried out a research program on HII (ionised hydrogen plasma) regions, with a particular focus on modelling and observations of dissociation regions which exist on the periphery of HII regions. Dissociation of molecular hydrogen into atomic form (HI) occurs in these regions and involves complex heating and cooling processes. HI can be observed directly with radio telescopes. He also collaborated with others on observations and studies of large supernova remnants.

This research was well suited to observations with the DRAO Synthesis telescope, a 7-antenna interferometer, which he helped design and build, including early digital processing systems called correlators.

Along the way, he co-supervised students, especially those using NRC's facilities for their graduate work, including students developing instrumentation or software algorithms and those involved in pure science. Deconvolution of under-sampled images made with radio telescopes was a particular area of interest. In 1992 he was appointed Adjunct Professor in the Department of Physics and Astronomy, University of Calgary.

In the 1990s, he turned his attention to the instrumentation side of radio astronomy by collaborating on several large international projects, most of which are listed below. During that time, NRC was contemplating how Canada's directions for astronomy should evolve. In 1995, he was appointed NRC's "Coordinator for Future Radio Astronomy Projects". This work required taking a long view while at the same time looking for near-term opportunities for international collaboration. There was strong interest in mm-wave astronomy at that time, with competing ideas in the US and Europe. Ultimately, Canada joined the ALMA project as a partner with the US. Also, during this period, he was involved in the future SKA project, which was evolving from discussions among an international group of radio astronomers to more formal initiatives.

In the early part of this century, he took on a management role at NRC to coordinate the growing number of people working on radio astronomy projects, playing a leading role in the projects listed below. He was also interested in developing relations with industry, particularly those in businesses related to technology used for radio astronomy.

In 2008 he left the NRC to take up a position at the University of Manchester in 2008 as Project Engineer for the Preparatory Phase of the SKA (PrepSKA). In 2012 he joined the Square Kilometre Array Organisation for its pre-construction phase, where he became the SKA Architect responsible for the coalescing the design, based on previous work during PrepSKA. Although having returned to

Canada in 2018, he continues to hold the position of SKA Architect, but acting in an advisory role to the engineering staff as the SKA is being constructed.

He is frequently asked to participate in review committees for radio astronomy projects.

Publications:

He does not track publications closely. According to ResearchGate, a publication tracking system, he is author or co-author on more than 200 journal and conference papers. This does not include the many technical reports for the SKA and previous projects.

Projects (very approximate order):

- Radio Schmidt Telescope. This telescope was designed in the 1980s to image very low brightness, extended regions of emission that was difficult to observe with telescopes existing at the time. Although never constructed, this telescope idea was a precursor to the Large-N-Small-D idea that later took root in the design of the SKA.
- Very Long Baseline Interferometry. Principal Investigator for Canada in an international space mission, HALCA, led by the Japanese space agency, ISAS. Closely involved in early collaboration on the RadioAstron mission in the USSR (later Russia). The sole Canadian in the group that received an award from the International Academy of Astronautics, the "Laurels for Team Achievement" for this work.
- Odin, a sub-mm Space Telescope. Principle motivator for Canadian involvement in this Swedish mission, leading to a Herzberg Institute Outstanding Achievement Award.
- Canadian Galactic Plane Survey. Collaborating with two prominent radio astronomers in Canada, began an epic survey of the Milky Way to image the distribution of neutral atomic hydrogen and continuum emission. This project required years of observing and these images remain among the most complete available.
- Spectrometer for the James Clerk Maxwell Telescope (JCMT). Led the group in the design and construction of digital spectrum analysers (ACSIS) to match an array of sub-mm receivers developed in the UK (HARP). This facility is still available, although the JCMT is now operated by the East Asian Observatory.
- Large Adaptive Reflector (LAR). Led the design of a novel radio-telescope design to enable very large telescopes to be constructed. This was an ambitious undertaking involving a team of about 20 researchers and graduate students from five universities. The purpose was to compete for the design of SKA antennas. This project was eventually dropped in favour of the Large-N-Small-D (LNSD) approach to the SKA design.
- The Square Kilometre Array (SKA). From its early conception as a next-generation radio telescope, closely involved in the international group of radio astronomers who eventually brought this project to fruition. As outlined above, later joined the project formally.
- The Correlator for the Expanded Very Large Array (EVLA, now the Jansky VLA). Led the project to build a large single-purpose supercomputer to process signals arriving from the array of antennas constituting the Very Large Array, the world's most prominent radio telescope. A large project requiring a dedicated team, the technology was an out-growth of similar work done for the Space VLBI project, HALCA. It was delivered shortly after he left to work on the SKA in the UK.
- Composite Antennas. This project was an outgrowth of the LAR project and carried on after he left NRC in 2008, and continues to the present. It explored the use of carbon fibre composites to manufacture highly accurate radio reflectors. This was developed to contend for the SKA antenna design in a diameter range suitable for the LNSD approach to the SKA design. Although

not mature enough for SKA deployment, this method is now being used to construct the approximately 600 antennas for the CHORD project, a telescope currently under construction, as well as for several space tracking antennas.

Positions:

National Research Council of Canada: NRC Research Officer, ending as NRC Principal Research Officer.
University of Manchester / SKA: International Project Engineer.
SKA Organisation: SKA Architect.