

Éloge du Pr Thomas G. Phillips lors de la cérémonie de remise des diplômes de Docteurs Honoris Causa de l'Observatoire de Paris, le 13 novembre 2014, prononcé par Michel PERAULT, LERMA

Distinguished representatives of the countries and institutions at honour today, esteemed colleagues and friends, dear Tom,

Thomas Gould Phillips is today Professor Emeritus at Caltech, having accomplished a very impressive scientific career of over 50 years, most of it at the prestigious California Institute of Technology.

Tom grew up in London as a bright pupil and student, and completed a thorough education in Physics at Oxford with his PhD thesis in 1964, then hold a postdoc at Stanford, became a lecturer at Oxford again, before taking his first long term position at Bell Labs NJ in 1968.

His choice of low temperature solid state physics led him to work on various devices. Involved in InSb bolometer technology at Bell Labs from 1968 onwards, not far from Arno Penzias' and Tom Wilson's laboratory, who were detecting the first emission lines from cold dense molecular clouds (CO), Tom was challenged by Penzias (1970) to implement his ideas for more sensitive receivers. This is how the first InSb Hot electron bolometer was used for heterodyne detection (1973), capable of high resolution spectroscopy from 100 to 600 GHz, and that is how Tom and collaborators made a number of first detections from the ground up to 345 GHz (CO J=2-1, DCN, CO J=3-2), and later from space (KAO 1980-85) CO J=4-3 as well as ground state lines of very important species including CI, NH<sub>3</sub> and HCl up to more than 600 GHz. In the meanwhile Tom kept searching ways to overcome the narrow bandwidth limitation of the InSb device, until he convinced himself around 1975 that the tunnel junction superconducting devices, which had been developed for supercomputers by IBM and BellLabs, but failed, could usefully be turned into heterodyne detectors at high frequency. With a small team he could demonstrate 4 years later that his intuition of using the quasi-particle tunneling effect was right when he reported successful observations at 115GHz with an SIS receiver 3 times more sensitive than the best competitors at this time.

These inventions inspired much of the later developments in the community worldwide, including in Europe and especially in France, under the leadership of Pierre Encrenaz. They later became the enabling technologies for the heterodyne receivers equipping IRAM, the Herschel Space Observatory, as well as ALMA and SOFIA. This is impressive I think, but it is far from being the only major contribution of Tom Phillips to submillimeter astrophysics.

During a long term visit to Cambridge, back in 1975, Tom had written an ambitious proposal for a submillimeter telescope as asked to him by Martin Ryle. The project was pushed forward but failed to join the French and German efforts towards IRAM. It became the JCMT instead, built under Richard Hills' leadership. Upon his return to Bell Labs, Tom kept thinking of the prospects of a submm observatory, and he did not resist professor Bob Leighton's invitation in 1979 to join Caltech's staff with the perspective of complementing the OVRO mm interferometer with a large submm telescope on top of a mountain. Although things did not happen as straightforwardly, and although Tom had to make the interferometer work and to run it during a number of years in the first place, it did happen, and the CSO success story started in 1987 through now. Many tens of PhD students and postdocs got trained there many of them under Tom's direct guidance.

And once again, he continued his march forward, convincing NASA in the meanwhile to join the ESA's project of a submm observatory in space, later named Herschel, which proved to be extraordinarily successful, and while Herschel was launched in 2009 Tom was already planning the CSO shutdown in 2016 in order to make room for the development of the future generation submm telescope CCAT.

Again it would be great injustice to limit Professor's Phillips achievements in research to the invention of so important technologies, building receivers, designing telescopes, constructing and

running observatories, and generously contributing his broad expertise to many national and international committees. On top of this Tom has also gone an impressive way into what progressively became his main driver, namely the astrophysics of comets, planets, stars and galaxies, using submillimeter spectroscopy as his major tool. He kept searching new species, and trying to model the dynamical and chemical evolution of these objects: turbulence, and deuteration are among the rich subjects that he contributed to turn into major advances of our understanding of physical processes in the interstellar space.

Born and educated in Europe, Tom kept strong links to Europe throughout his career, and developed privileged links with France along the years. Much connected to IRAM for many years, with a 16 years mandate in its Science Advisory Committee, US principal investigator of ESA's Herschel Space Observatory, Tom has also developed a long and still lasting strong collaboration with many colleagues in France, especially from our Observatoire, most prominent being Edith Falgarone, Maryvonne Gerin, Dominique Bockelée. From the 90's onward, not far from half of his very numerous publications have been coauthored with French colleagues, many of them with very original discoveries. It is significant that among Tom's 10 most cited papers, 3 have French female first authors.

Tom has conducted a very generous invitation policy in his Lab at Caltech, and at the CSO. This needs to be saluted as it fostered a number of major discoveries, and helped our national community a lot.

Tom is a profound and thorough scientist covering a vast spectrum of expertise and achievements, very much like the most illustrious figures of the 19<sup>th</sup> Century, but also armed with the mighty power of the 20<sup>th</sup> Century Physics and Technology, and much engaged in building the 21<sup>st</sup> Century science with his leading participation to recent major undertakings.

I am glad, and feel honoured to have had the opportunity to express my admiration and profound esteem to Tom at the solemn occasion of the present ceremony. Thank you Tom.