

Honorary Doctor of Science

Professor Evelyn L. HU

Public Orator Professor WANG Xunli

Mr Pro-Chancellor:

Professor Evelyn L. Hu is one of the world's foremost scientists. As the Tarr-Coyne Professor of Electrical Engineering and Applied Science at Harvard University, she is an inspiration to physicists and engineers in all parts of the globe, an exciting role model for her students and collaborators, and an icon for countless numbers of girls contemplating a career in science and technology.

She is a member of the National Academy of Sciences, National Academy of Engineering, American Academy of Arts and Sciences, Academia Sinica in Taiwan, and a Senior Fellow of the Hong Kong Institute for Advanced Study at City University of Hong Kong.

Her research matches nanofabrication techniques with the integration of materials that allow the formation of structures and devices with exceptional electronic and photonic behaviour. This behaviour can give rise to efficient, controlled and often coherent output of devices, which is the basis of innovative approaches to harnessing “quantum information”. One example is the focus on coupling artificial atoms, such as quantum dots or colour centres in diamond, into carefully crafted nanoscale optical cavities.

Yet Professor Hu is genuinely humble about her career, unassuming about her stellar achievements, and completely unpretentious. She modestly dissociates herself from the term “trailblazer”, even though many would consider this a perfectly apt term to encapsulate the impact of her work.

Professor Hu was born in New York City to parents from Shanghai. Her father was a mechanical engineer and her mother pursued doctoral studies in economics. Her parents' passion for academic work undoubtedly influenced Professor Hu as she exhibited exceptional ability in learning, particularly in mathematics. Professor Hu

took advantage of the broad education opportunities at Hunter College High School in New York City where she studied subjects as diverse as science, music, Latin, Russian, and literature. She studied physics at Barnard College and then completed her master's degree and PhD in physics at Columbia University.

You might think that studying science, engineering and physics in the US in the 1960s was challenging. Fewer women than now studied these disciplines back then, but Professor Hu says she took it for granted that women could be just as successful as men in science. Not only were her parents incredibly supportive, but she also recalls their excitement about the pioneering work of Madame Wu Chien Shiung, another near-Shanghai native and one of the world's most influential experimental physicists. Later on, she was fortunate to complete her PhD studies under the supervision of Madame Wu at Columbia University.

A critical juncture in her development as a scientist was her first postgraduate work opportunity at the US research company Bell Labs where she started to work in solid-state physics. This was a new field for her and she had to learn on the job, absorbing new knowledge about the foundational theories behind each project. At about this time, she began to see the enormous potential of fabricating small solid-state structures and devices.

Several decades later, Professor Hu refrains from identifying a particular experiment, study, article, or project that defines her work. Instead, she emphasises that a career is rarely defined by single moments but instead by a confluence of ideas and revelations that build on each other and where extraordinary physical behaviour can be manifested as time and knowledge proceed.

An example is her focus on sculpting structures at the nanoscale in electronic and photonic materials, providing precision and delicacy in the formation of a device, while at the same time “respecting”, or not damaging, the material. Another is her long-term focus on exploring new material structures, such as quantum dots or newly emergent materials where the art of fabrication is unknown. The accumulation of insights has allowed her present focus on using atomic-scale “defects”, or imperfections, in materials as the basis of quantum mechanical information, or “qubits”, integrated within uniquely fabricated amplifiers. Although her focus probes the fundamental science of materials and devices, she has a strong dedication to the ultimate applications of those devices.

Regarding the latter point, she is adamant that universities and industry must seek ever-stronger ties and collaborations on projects that will benefit society. It is the collective responsibility of both academia and industry, she says, since the problems we face cannot be tackled without matching the strengths of fundamental research to the knowledge of scale-up, manufacturing and deployment that industry knows best.

Professor Hu finds the greatest reward throughout her career has been twofold. One is in helping to establish and guide collaborative research programmes that bring together talents from different disciplines and expertise, providing a foundation of tools, ideas and interactions that form an enduring, engaged, and productive community. She has helped to form and guide a science and technology centre at the University of California, Santa Barbara (UCSB), the California NanoSystems Institute, a centre that linked UCSB and University of California, Los Angeles and most recently, the Harvard Quantum Initiative.

An integral part of all these collaborative centres has been the education programmes at levels ranging from elementary education to postdoctoral engagement. In fact, her other greatest reward has been witnessing her students' progress, watching them flourish as scientists and engineers, seeing them take on the leadership and guidance of others, and ultimately, giving back to society through their own work.

Role models are important in guiding our choices, and we inevitably identify those whom we think might serve as exemplars. Her advice to students, however, is to look deep within themselves and ask, "What do I want?" and "What can I do?" She appreciates that many young people might feel daunted by a career in science, which is why she stresses the need to identify your strengths, not your weaknesses, and reflect on your potential and desires.

Mr Pro-Chancellor, for her pioneering work in physics and engineering, for exemplifying the role women can play in science and technology, and for inspiring legions of students and researchers for many years, may I present Professor Evelyn L. Hu for the conferment of Doctor of Science, *honoris causa*.