

THE “MUSIC” OF LIGHT: OPTICAL RESONANCES FOR FUN AND PROFIT

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Moore’s Law has set great expectations that the performance/price ratio of commercially available semiconductor devices will continue to improve exponentially at least until the end of this decade. But the physics of the metal wires that connect the transistors on a silicon chip already places stringent limits on the performance of integrated circuits, making their continued dramatic improvement highly unlikely. In this talk, I will introduce the basic concept of an optical resonance in a microscopic dielectric cavity in the context of the same type of spatial boundary conditions that give each musical instrument its unique sound. Then I will illustrate applications of these resonances to information technology in a variety of forms and functions using examples from my own laboratory at HPE, such as chip-scale optical networks, quantum bits based on spins in diamond, and ultrafast optical switches that could become the foundation for a new generation of optical computers. Our goal is to conduct advanced research that could precipitate an “optical Moore’s Law” and allow exponential performance gains to continue through the end of the next decade.



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SPEAKER BIO

Ray Beausoleil is a Hewlett Packard Enterprise (HPE) Senior Fellow in Fundamental Technologies at Hewlett Packard Labs, and an Adjunct Professor of Applied Physics at Stanford University. At HPE, he leads the Large-Scale Integrated Photonics research group, and is responsible for research on the applications of optics at the micro/nanoscale to high-performance classical and quantum information processing. His current projects include photonic interconnects for exascale computing, and low-power complex nanophotonic circuits. Ray received the Bachelor of Science with Honors in Physics from the California Institute of Technology in 1980; the Master of Science degree in Physics from Stanford University in 1984; and his Ph.D. in Physics from Stanford in 1986 as a member of Ted Hansch’s research group. In 1996, Ray became a member of the technical staff at HP Laboratories. Among his early accomplishments at HP, he invented the optical paper-navigation algorithms incorporated into the HP/Agilent optical mouse, and now HP’s large-format printers. He has published over 300 papers and conference proceedings and five book chapters. He has over 115 patents issued, and over three dozen pending. He is a Fellow of the American Physical Society, and the recipient of the 2016 APS Distinguished Lectureship on the Applications of Physics.

Contact Professor Jiming Bao at jbao@uh.edu if you would like to arrange for a time to meet with Dr. Beausoleil.

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