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W. W. Hansen, Microwave Physics, and Silicon Valley

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The Stanford physicist W. W. Hansen (b. 1909, AB '29 and PhD '32, MIT post-doc 1933-4, Prof. physics '35-'49, d. 1949) played a seminal role in the development of microwave electronics. His contributions underlay Silicon Valley's postwar "microwave" phase, when numerous companies, acknowledging their unique scientific debt to Hansen, flourished around Stanford University. As had the prewar "radio" companies, they furthered the regional entrepreneurial culture and prepared the ground for the later semiconductor and computer developments we know as Silicon Valley. In the 1930's, Hansen invented the cavity resonator. He applied this to his concept of the radio-frequency (RF) linear accelerator and, with the Varian brothers, to the invention of the klystron, which made microwave radar practical. As WWII loomed, Hansen was asked to lecture on microwaves to the physicists recruited to the MIT Radiation Laboratory. Hansen's "Notes on Microwaves," the Rad Lab "bible" on the subject, had a seminal impact on subsequent works, including the Rad Lab Series. Because of Hansen's failing health, his postwar work, and MIT-Stanford rivalries, the Notes were never published, languishing as an underground classic. I have located remaining copies, and will publish the Notes with a biography honoring the centenary of Hansen's birth. After the war, Hansen founded Stanford's Microwave Laboratory to develop powerful klystrons and linear accelerators. He collaborated with Felix Bloch in the discovery of nuclear magnetic resonance. Hansen experienced first-hand Stanford's evolution from its depression-era physics department to corporate, then government funding. Hansen's brilliant career was cut short by his death in 1949, after his induction in the National Academy of Sciences. His ideas were carried on in Stanford's two-mile long linear accelerator and the development of Silicon Valley.