In the century-old art of power amplifier design, the tradeoff between excellent circuit linearity vs. good energy efficiency is a well established headache. In this presentation we explore a reverse approach: instead of designing a linear circuit and then working to improve its energy efficiency, we will start from a maximally efficient circuit and make it work very well with ‘linear’ signals. This reverse approach leads to switch-based RF circuit design and polar coordinate signal processing, which is quite different from linear circuit design and quadrature (Cartesian) signal processing. Extensions to the concept of circuit gain when nonlinearity is present are developed. Applicability of FET and Bipolar transistors to this approach is discussed, along with a wide range of new circuit design issues that arise. Wide dynamic range power control and wide bandwidth phase modulation are also addressed.

Biography: Earl is a serial entrepreneur from Silicon Valley with over 35 years of experience in design of wireless circuits, modulations, and systems. In recent years he has focused on breaking the standard tradeoff between power amplifier linearity and energy efficiency, which led him to switch-based circuit design techniques and polar signal processing. He has learned across this career that a thorough understanding of physical fundamentals is essential to avoid making huge mistakes, providing an extremely useful check on mathematical derivations and computer simulations.

Earl holds over 50 US patents, and is frequently an invited speaker at conferences worldwide. He is a graduate of UC Berkeley, Stanford, and UC Davis. He has been a Silicon Valley entrepreneur since 1986, starting up two groundbreaking technology companies that both provided successful exits to the investors. His work experience includes NASA, Hewlett-Packard (now Agilent), Watkins-Johnson, Cushman Electronics, Digital RF Solutions (start-up #1), Proxim, Tropian (start-up #2), and Panasonic. At Panasonic, he was named a Technology Fellow in 2008. Having retired from industry in 2008, he is now a consultant, instructor, and visiting professor at multiple universities.

Seminar is in EEB 248 from 3-4:30PM on Friday, September 23rd