

**From Electrons Paired to Electric Power...and Back Again
-- A Personal Journey in Superconductivity at IBM, EPRI, and Beyond --**

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2011 marks the 100th anniversary of the [discovery](#) of [superconductivity](#) in Leiden, Holland, the 25th of the observance of its high temperature embodiment by Georg Bednorz and Alex Mueller in Rueschlikon, and a Century since the formation of the company that became IBM by its Founder, Thomas J. Watson. This talk will reprise a personal journey throughout a portion of this history by the speaker, raised in an IBM family in Wappingers Falls, NY, employed by the company in 1953 at age 17, eventually retiring as a Research Staff Member in 1993. His Research Division career focused primarily on basic research in superconducting and conducting organic materials. Following "retirement," he accepted a position as a Science Fellow in the Electric Power Research Institute, supervising a \$5M/yr funding program in power applications of superconductivity, power electronics semiconductor materials and devices, advanced "hot" fusion technologies, and deflecting various "bad science" proposals. His transition from a culture of technology in support of commercial gain, to that of the energy enterprise, dominated primarily by socio-political interests with technology driving at best 50% of its direction, was an epiphany accompanied by culture shock. Especially illuminating was occasional participation in "energy policy sausage making" sessions with both congressional and Department of Energy staff.

Over the past two decades, multiple power applications of superconductivity have undergone successful development, prototyping and demonstration both in the US and abroad. The technology now "sits on the shelf" ready for [deployment](#). However, despite earlier "hopes and hypes," it is unlikely that "massive" insertion of superconductivity into the nation's electricity infrastructure will occur for some time to come for reasons which will be discussed. However, we may see its playing a role, especially in cables, in upcoming energy "[megaprojects](#)" as ancillary and parallel to natural gas pipeline deployment where a portion of the gas would be converted to electricity by "well-head" generation at the gas fields proper.

He retired from EPRI in 2004 and from 2005-2008 held a position as Visiting Scholar in Applied Physics at Stanford. From this latter period to the present, he has re-pursued his "day job" at IBM in the 1970s in computational physics, applying density-functional-theory to model various aspects of the high-temperature copper oxide perovskite superconductors. The last portion of the presentation will review his ongoing studies on cubic and tetragonal rocksalt copper oxide as [proxies](#) for the corresponding high-Tc materials. One interesting observation is that Alex Mueller may have been on the right track in suggesting that Jahn-Teller instabilities may indeed be one of the forcing-factors underlying superconductivity in the cuprates.