Superconductivity at IBM – a Centennial Review: Part I – Superconducting Computer and Device Applications

William J. Gallagher*, Erik P. Harris, and Mark B. Ketchen

Thomas J. Watson Research Center,
P.O. Box 218, Yorktown Heights, NY 10598
*email: glgr@us.ibm.com

Abstract - The hundred-year anniversary of the discovery of superconductivity coincided with the centennial of the founding of IBM. For more than half its history, IBM has had significant research and development activities in superconductivity. These included the two largest industrial programs aimed at developing superconducting digital computers. They also included a fundamental physical science program out of which came the discovery of high-temperature superconductivity. Significant fundamental and applied superconductivity research continues today within IBM, including work on superconducting qubits, which may portend a third major superconducting computer development program. This article reviews IBM's applied superconductivity work in the context of the evolution of the IBM Corporation. A companion article reviews the physics and materials science research activities.

Keywords – Superconductivity, superconducting thin films, superconducting digital electronics, cryotron, Josephson computer, SQUID, SQUID microscope, magnetic gradiometer, qubit, quantum computer

Received May 22, 2012; accepted June 20, 2012.
Reference No. RN28-1; Categories 4, 13