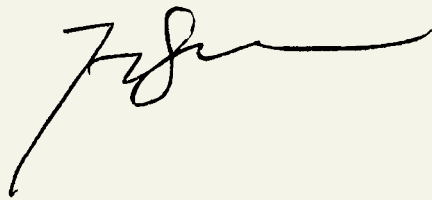

Various sources of radiation can induce sufficient free carriers to change the state of a transistor, resulting in a *soft error*. The reduced transistor size and low power operation of modern circuits require that greater emphasis be placed on controlling and understanding sources of soft errors in devices, circuits, and final system applications. Continued improvement in understanding the physics of soft errors and in devising effective mitigation strategies is of critical importance for future server systems.

The nine papers in this issue of the *IBM Journal of Research and Development* review the current understanding of the soft-error rate (SER) in CMOS (complementary metal-oxide semiconductor) devices, circuits, and servers. This issue highlights and describes the role of alpha-particles (helium nuclei), mitigation strategies, physics-based nuclear models, and device design, as well as treatment of experimental data and strategies for reducing SERs in complex servers. As these papers illustrate, this subject requires the collaborative efforts of experts in fields ranging from basic nuclear physics to device and component engineering and testing, as well as computer hardware and software architecture. Only through such collaborative research across the full stack from device to system can the effects of SERs be understood and mitigated.



Tze-Chiang (T.-C.) Chen
Vice President, Science and Technology
IBM Research Division
