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TID Mechanisms in Nanometer-Scale Microelectronic Technologies

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Abstract:

Ionizing radiation may affect the reliability of the electronic devices, inducing a variation of their nominal electrical characteristics and degrading their performance. The lecture focuses on the dissection of TID mechanisms based on the evaluation of measurable effects affecting the electrical response of transistors. Technologies dedicated to high-energy-physics experiments have been tested at ultra-high doses, never explored thus far. Different approaches, as charge pumping, low frequency noise and technology computer-aided design simulations allow to identify the location, density and energy levels of the defects, whose investigation is essential for proposing solutions to improve their TID tolerance. The evolution of fabrication processes in the semiconductor industry leads to an unpredictable trend in TID effects, requiring continuous efforts for testing and qualifications of electronics.

Short Bio:

Stefano Bonaldo received the M.Sc. degree in Electronic Engineering at the University of Padova, Italy, in 2016. He spent one year at CERN, Switzerland, where he developed the radiation monitoring system for the start-up of CHARM facility. In 2020, he obtained the PhD degree in Information Engineering at the University of Padova with research focus on reliability and radiation effects on electronic devices in advanced CMOS technologies. He spent one year at the Vanderbilt University, US, where he investigated the radiation effects on III-V devices and low-frequency noise. He is currently a postdoctoral researcher at the Department of Information Engineering of the University of Padova, Italy, with focus on the exploration of TID effects in ultra-scaled CMOS technologies for space and high-energy physics applications.

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