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Modeling Cumulative Radiation Effects in Semiconductor Devices and Integrated Circuits

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Abstract:

Designing integrated circuits requires accurate models to capture the physics of a circuit's fundamental device, the transistor. Successful modeling of transistor operation has been one of the great achievements in physics and engineering in the past 100 years. Models are particularly important when we consider the challenges posed by cumulative radiation damage. Accurate modeling at the device-level is critical to helping us simulate radiation effects in circuits, through compact models that are radiation-aware. In this course, Professor Barnaby will review models for Complimentary MOS (CMOS) field-effect transistors (FETs) and Bipolar Junction Transistors (BJT). Once the mechanisms of radiation damage in these transistors have been presented, he will describe, the various methods used to model these cumulative effects, from devices to integrated circuits.

Short Bio:

Hugh Barnaby, Professor of Electrical Engineering at Arizona State University, has been an active researcher in the microelectronics field for over 29 years in both industry and academics, presenting and publishing more than 300 papers during this time. He is an IEEE fellow and has served as journal Associate Editor for the IEEE Transactions on Nuclear Science and has served many roles at NSREC, including general chairperson in 2020, RADECS. This will be the fifth time he has been an instructor at SERESSA. His previous courses were given in Brazil, USA, Argentina, and Japan. His primary research focuses on the analysis, modeling, and experimental characterization of radiation effects in semiconductor materials, devices and integrated circuits.

Organizers: