SMACD 2025
Istanbul-TURKIYE
"where circuits come alive"

KEYNOTE TALK

Speaker

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Christian Enz, PhD, Swiss Federal Institute of Technology (EPFL), 1989. Currently Professor Emeritus from EPFL since March 2023. Former director of the Institute of Microengineering and of the EPFL campus in Neuchâtel and head of the IC Lab. Until April 2013, VP at the Swiss Center for Electronics and Microtechnology (CSEM), Switzerland. Until 1999, Principal Senior Engineer at Conexant, Newport Beach, CA. His technical interests and expertise are in the field of MOSFET modeling applied to the design of ultra low-power and low-noise analog and RF circuits. Together with E. Vittoz and F. Krummenacher he is the developer of the EKV MOSFET model. He is the author and co-author of more than 300 scientific papers and has contributed to numerous conference presentations and advanced engineering courses. He is an IEEE Fellow and an individual member of the Swiss Academy of Engineering Sciences (SATW). He has been an elected member of the IEEE Solid-State Circuits Society (SSCS) AdCom from 2012 to 2014 and was Chair of the IEEE SSCS Chapter of Switzerland until 2017.

EKV model for the design of Cryo-CMOS circuits

This talk highlights some of the challenges faced for the modeling of MOSFET devices for operation at cryogenic temperature (CT). It will briefly review the most important phenomena, including the saturation of the subthreshold slope below a critical temperature, the increase of the threshold voltage, the subthreshold current components including thermionic, hopping and tunneling currents, the self-heating effect and finally the noise. Many circuits used for quantum computers and working at CT operate at RF. It is therefore important to understand how the dc model can be extended to RF. Then, we will investigate how the normalized Gm/ID figure-of-merit (FoM) can help designing cryoCMOS circuits taking advantage of its temperature independence. Finally, we discuss how the simplified EKV (sEKV) compact model (CM) can help designing CMOS circuits at cryogenic temperature.