



Contribution ID: 21

Type: **Poster presentation (105min)**

Commercial Electronic Components and Silicon-on-Sapphire ICs at Extreme Cryogenic Temperatures

Tuesday 8 July 2014 14:15 (1h 45m)

Electronic circuits generally perform well at moderately cold temperatures, but can show interesting and negative behaviors as extreme cryogenic regimes are reached. This paper looks at the performance of Silicon-on-Sapphire (SOS) and selected commercial silicon devices operating to temperatures at and below the freezing point of nitrogen. While expected freeze-out behavior is observed clearly in a commercial silicon device (1N4001 rectifier), SOS resistors and transistors tested using the same setup did not experience this effect, and in some cases stayed reasonably well-behaved to 5 Kelvin. However, unlike other reported investigations of SOS devices operating at extreme cryogenic temperatures, strong kink-effects were observed, especially for devices operating at low V_{gs} overdrives (weak inversion). These results point out both problems and promises of developing electronics in an RF and mixed-signal IC process suitable for use in exploring the surface of outer-planets and their moons.

Primary author: Mr MELTON, Steven (Honeywell Co.)

Co-authors: Dr RYS, Andrew (Kansas State University); Mr FUND, Andy (Kansas State University); Mr BURRESS, Weston (Sikorsky Aircraft Co.); Dr KUHN, William (Kansas State University)

Presenter: Dr RYS, Andrew (Kansas State University)

Session Classification: Tue-Af-Posters Session 1.3

Track Classification: C-12: Various applications of superconductors