Contribution ID: **287** Type: **Poster**

Modeling of Low Temperature and Low Noise Devices

Wednesday 27 August 2025 18:00 (2 hours)

With the continuous advancement of research on deep subsurface dark matter, low-background and low-noise detection devices have become the mainstream and hotspot of research. Low noise, high-density, arrayed sensing and amplification devices that can meet high sensitivity and energy resolution have become the key research objects of detection devices. InP devices have excellent low-temperature electrical properties and low noise performance due to physical characteristics such as conduction band discontinuity at the heterojunction InAlAs/InGaAs interface, high two-dimensional electron airtightness, high electron mobility in the channel, and small differences in thermal expansion coefficients of lattice matching systems. Our research group has conducted research on low-temperature modeling techniques for InP devices. Including low-temperature small signal equivalent circuit model, low-temperature noise matrix, and physical meaning of the model; Low temperature small signal equivalent circuit model parameter extraction technology, including intrinsic component parameter extraction, parasitic capacitance, inductance, and resistance parameter extraction. At the same time, using artificial neural network models to learn low-temperature passive device models has improved the modeling speed and scaling accuracy of the models. It can provide accurate low-temperature device parameters for the design of low-temperature front-end circuits, which is of great significance for shortening the design cycle, reducing design costs, and improving reliability.

Collaboration you are representing

Authors: Prof. 李, 仲茂 (中国科学院微电子研究所); Prof. 李, 志强 (中国科学院微电子研究所); Prof. 李, 冷 (中国科学院微电子研究所)

Presenter: Prof. 李, 仲茂 (中国科学院微电子研究所)

Session Classification: Poster session

Track Classification: Underground Laboratories