

ED4-1-INV

EDA for Superconducting Circuits

*Coenrad J. Fourie¹

Department of E&E Engineering, Stellenbosch University, Banghoek Road, Stellenbosch, 7600¹

Superconducting integrated circuits have long been completely handcrafted or at best designed with a loose collection of tools that require manual manipulation of data and design transfer between tools. Electronic Design Automation (EDA) software development requires significant investment of resources to track the evolution of integrated circuit fabrication processes, which has only been possible commercially for highly successful semiconductor integrated circuit processes. The IARPA SuperTools project which started in 2017 is the largest known investment to date made in superconducting EDA tool development. SuperTools is divided into two main categories: high-level tools for the synthesis of digital logic circuits, clock networks and placed-and-routed layouts for systems such as processors with millions of logic gates; and physical-level tools for the design, simulation, optimization, verification, layout and parameter extraction of devices and digital logic cells with the inclusion of fabrication process simulation. In this paper the physical-level tools are presented by way of a design example, from device characterization through logic circuit conception and design to layout verification and cell library sign-off.