

# **Advancing Analog Precision: Memristor Technology for Scientific Computing**

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Due to precision limitations, analog devices such as memristors have historically been confined to specialized, low-precision applications like neural networks. To overcome these constraints and extend their applicability into scientific computing, we comprehensively studied the sources of reading noise and successfully mitigated them, achieving up to 2048 stable conductance levels. Additionally, through a co-designed approach involving system circuit architecture and programming algorithms, we have significantly reduced device programming variability and improved overall precision. These advancements have enabled us to demonstrate high-precision computing applications with notably enhanced power efficiency, highlighting the expanding potential of memristors for next-generation computing paradigms.