SCIENCE CHINA Information Sciences

Recent publications on microelectronics and quantum information

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Wang Z H, Fang J W, Zhang P C, et al. **Nanomechanics: emerging opportunities for future computing**. Sci China Inf Sci, 2021, 64(10): 206401

Keywords: mems; nems; mechanical computing; logic devices; switches; resonators

Zhang Z, Chang H L. **Resolution limit of mode-localised sensors**. Sci China Inf Sci, 2021, 64(4): 142401

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Keywords: weight decision problems; chebyshev polynomials; exact quantum query complexity; exact quantum algorithms; quantum computing

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Keywords: squeezed spin states; uhrig dynamical decoupling; control pulses; quantum control; quantum metrology; quantum information science

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Keywords: difference-frequency generation; mid-infrared source; PPLN; random laser; temperature-tuning free

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Keywords: Tearhertz detector; SnSe2 nanofilm; Au split ring array; 6G communication; low bias

Xiang J J, Pan Q, Zhang Z G, et al. **Double-branch fusion network with a parallel attention selection mechanism for camouflaged object detection**. Sci China Inf Sci, 2023, 66(6): 162403

Keywords: camouflaged object detection; attention mechanism; feature extraction; feature aggregation; texture information; fuzzy boundary

Luo Y, Sun C Z, Xiong B, et al. **High-speed optoelectronic devices**. Sci China Inf Sci, 2023, 66(5): 150401

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Huang L J, He Z Y, Fan X Y. **Simplified single-end Rayleigh and Brillouin hybrid distributed fiber-optic sensing system**. Sci China Inf Sci, 2023, 66(2): 129404

Keywords: optical fiber sensor; distributed fiber-optic sensing; Rayleigh backscattering; Brillouin backscattering; optical measurement technology

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Keywords: microwave photonics; photonic integrated circuits; microwave photonic link; microwave photonic signal processor; optoelectronic oscillator; radio over fiber

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Song Z W, Xiang S Y, Cao X Y, et al. **Experimental demonstration of photonic spike-timing-dependent plasticity based on a VCSOA**. Sci China Inf Sci, 2022, 65(8): 182401

Keywords: neuromorphic photonics; vertical-cavity semiconductor optical amplifier; spike-timing-dependent plasticity; optical neural systems; pulsed optical injection

Cui Q, Lei Y X, Chen Y Y, et al. **Advances in wide-tuning and narrow-linewidth external-cavity diode lasers**. Sci China Inf Sci, 2022, 65(8): 181401

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Keywords: graphene; magneto-optical device; isolator; waveguide; terahertz

Wang B, Zhou P Q, Wang X J, et al. **A low-fabrication-temperature, high-gain chip-scale waveguide amplifier**. Sci China Inf Sci, 2022, 65(6): 162405

Keywords: photonic circuit integration; low fabrication temperature; high gain; rare earth material; waveguide amplifier

Hao Z, Ma Y X, Jiang B Q, et al. **Second harmonic generation in a hollow-core fiber filled with GaSe nanosheets**. Sci China Inf Sci, 2022, 65(6): 162403

Keywords: second-harmonic generation; gallium selenide; hollow-core fiber; broadband operation wavelength; time-varied second harmonic generation

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Keywords: optical microcavity; semiconductor lasers; coupled cavity; lasing mode control; photonic integration

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Keywords: random lasers; humidity sensor; wearable; plasmonic

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Keywords: poly(3-hexylthiophene); silicon; optoelectronic synaptic devices; cross-modal learning; transistor

Zhang Y H, Xiang S Y, Guo X X, et al. **A modified supervised learning rule for training a photonic spiking neural network to recognize digital patterns**. Sci China Inf Sci, 2021, 64(2): 122403

Keywords: vertical-cavity surface-emitting laser; modified supervised learning rule; optical spiking neural networks; learning system; pattern recognition

Zang Y B, Chen M H, Yang S G, et al. **Optoelectronic convolutional neural networks based on time-stretch method**. Sci China Inf Sci, 2021, 64(2): 122401

Keywords: convolutional neural networks; time-stretch method; artificial intelligence

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Keywords: GaN; Schottky barrier diode; double channel; transport mechanism; thermal stability; high breakdown voltage

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Keywords: hot electron transistor; tunneling; collection factor; current gain; interface

Ning H K, Yu Z H, Li T T, et al. **From lab to fab: path forward for 2D material electronics**. Sci China Inf Sci, 2023, 66(6): 160411

Keywords: two-dimensional materials; transition-metal dichalcogenides; equipment; integrated circuits; roadmap

Cheng D P, Sha W X, Xu Z, et al. **AtomGAN: unsupervised deep learning for fast and accurate defect detection of 2D materials at the atomic scale**. Sci China Inf Sci, 2023, 66(6): 160410

Keywords: deep learning; generative adversarial network; defect detection; atomic resolution; 2D materials

Chan S M, Poh E T, Leong J F, et al. **Bolstering functionality in multilayer and bilayer WS2 via focused laser micro-engraving**. Sci China Inf Sci, 2023, 66(6): 160409

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Yang F, Ng H K, Wu J, et al. **Simultaneous optimization of phononic and electronic transport in two-dimensional Bi2O2Se by defect engineering**. Sci China Inf Sci, 2023, 66(6): 160408

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Keywords: negative quantum capacitance; molybdenum disulfide; field-effect transistor; subthreshold swing; ultra-low power device

Leong J F, Lim K Y, Wu X, et al. **Selective enriching of trionic emission in a WS2-ZnO hybrid through type-II band alignment**. Sci China Inf Sci, 2023, 66(6): 160405

Keywords: heterostructure; trions; type-II band alignment

Yan T, Cai Y C, Wang Y R, et al. **Near-infrared optoelectronic synapses based on a Te/α-In2Se3 heterojunction for neuromorphic computing**. Sci China Inf Sci, 2023, 66(6): 160404

Keywords: near infrared; phototransistor; two-dimensional ferroelectric semiconductor; artificial neural networks; optoelectronic synapses

Zheng Z P, Huang Y J, Wu F, et al. **Multidimensional modulation of light fields via a combination of two-dimensional materials and meta-structures**. Sci China Inf Sci, 2023, 66(6): 160403

Keywords: two-dimensional materials; electromagnetic meta-structures; light field modulation; surface plasma polarisation; surface plasmon

Tong W, Liu Y. **Recent progress of layered memristors based on two-dimensional MoS2**. Sci China Inf Sci, 2023, 66(6): 160402

Keywords: memristor; switching mechanism; MoS2; 2D materials

Peng Z R, Lin R F, Li Z, et al. **Two-dimensional materials-based integrated hardware**. Sci China Inf Sci, 2023, 66(6): 160401

Keywords: two-dimensional materials; integrated circuit; integrated sensor; integrated optoelectronics

Qi G D, Chen X Y, Hu G X, et al. **Knowledge-based neural network SPICE modeling for MOSFETs and its application on 2D material field-effect transistors**. Sci China Inf Sci, 2023, 66(2): 122405

Keywords: knowledge-based neural network; MOSFET; 2D material FETs; Monte Carlo simulations; circuit benchmark

An X H, Zhang Y H, Yu Y F, et al. **Efficient charge transfer in WS2/WxMo1−xS2 heterostructure empowered by energy level hybridization**. Sci China Inf Sci, 2023, 66(2): 122404

Keywords: van der Waals heterostructure; band offset; hybridization strength; charge transfer; photoluminescence quenching

Wang Z H, Xu B, Pei S H, et al. **Recent progress in 2D van der Waals heterostructures: fabrication, properties, and applications**. Sci China Inf Sci, 2022, 65(11): 211401

Keywords: 2D materials; van der Waals heterostructure; interlayer coupling; stacking; layered nanostructures

Qin W J, Lv Y W, Xia Z, et al. **Van der Waals heterostructure tunnel FET with potential modulation beyond junction region**. Sci China Inf Sci, 2022, 65(10): 209401

Keywords: van der Waals; heterostructure; tunnel FET; type-III band alignment; channel potential; density functional theory; Hamiltonian

Liu F F, Xiao M M, Ning Y K, et al. **Toward practical gas sensing with rapid recovery semiconducting carbon nanotube film sensors**. Sci China Inf Sci, 2022, 65(6): 162402

Keywords: carbon nanotube; gas sensor; thin-film transistors; rapid recovery

Zhu J K, Zhang P C, Yang R, et al. **Analyzing electrostatic modulation of signal transduction efficiency in MoS2 nanoelectromechanical resonators with interferometric readout**. Sci China Inf Sci, 2022, 65(2): 122409

Keywords: mos2; 2d nems; resonators; laser interferometry; responsivity

Li Y C, Zhang N, Wang K Y. **Spin logic operations based on magnetization switching by asymmetric spin current**. Sci China Inf Sci, 2022, 65(2): 122404

Keywords: spin orbit torque; spin currents; spin current gradient; magnetization switching; spin logic

Xie Y N, Zhang Z Y. **Carbon nanotube-based CMOS transistors and integrated circuits**. Sci China Inf Sci, 2021, 64(10): 201402

Keywords: carbon nanotube; transistor; integrated circuit; scaling; nanoelectronics

Xu Y F, Li W S, Fan D X, et al. **A compact model for transition metal dichalcogenide field effect transistors with effects of interface traps**. Sci China Inf Sci, 2021, 64(4): 140408

Keywords: compact model; field effect transistor; transition metal dichalcogenide; mos2; interface traps

Wu S Q, Wang X D, Jiang W, et al. **Interface engineering of ferroelectric-gated MoS2 phototransistor**. Sci China Inf Sci, 2021, 64(4): 140407

Keywords: 2d materials; ferroelectrics; mos2 phototransistors; h-bn; interface engineering

Huang X Y, Zhang L, Liu L W, et al. **Raman spectra evidence for the covalent-like quasi-bonding between exfoliated MoS2 and Au films**. Sci China Inf Sci, 2021, 64(4): 140406

Keywords: mos2; raman spectroscopy; gold-enhanced mechanical exfoliation; low-frequency raman modes; covalent-like quasi-bonding

Xie J H, Zhang L J. **Optical emission enhancement of bent InSe thin films**. Sci China Inf Sci, 2021, 64(4): 140405

Keywords: inse; enhanced luminescence; 2d semiconductor; optical transition; optical anisotropy

Liu X, Wang W H, Yang F, et al. **Bi2O2Se/BP van der Waals heterojunction for high performance broadband photodetector**. Sci China Inf Sci, 2021, 64(4): 140404

Keywords: bi2o2se; bp; van der waals heterojunction; broadband photodetector; low dark current; narrow bandgap

An J R, Sun T, Wang B, et al. **Efficient graphene in-plane homogeneous p-n-p junction based infrared photodetectors with low dark current**. Sci China Inf Sci, 2021, 64(4): 140403

Keywords: infrared photodetector; graphene; p-n-p junction; dark current; photoresponse

Han R Y, Feng S, Sun D-M, et al. **Properties and photodetector applications of two-dimensional black arsenic phosphorus and black phosphorus**. Sci China Inf Sci, 2021, 64(4): 140402

Keywords: black arsenic phosphorus; crystal structure; optical property; electrical property; photodetector

Wu R, Zhu R-Z, Zhao S-H, et al. **Filling the gap: thermal properties and device applications of graphene**. Sci China Inf Sci, 2021, 64(4): 140401

Keywords: graphene; thermal properties; device application; thermal conductivity; 2d material

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Xia Z H, Wan R, Chen J N, et al. **Reconfigurable spatial-parallel stochastic computing for accelerating sparse convolutional neural networks**. Sci China Inf Sci, 2023, 66(6): 162404

Keywords: convolutional neural networks; stochastic computing; sparse neural networks; energy-efficient accelerator; high reconfigurability; spatial parallelism

Shi C, He J X, Pundlik S, et al. **Low-cost real-time VLSI system for high-accuracy optical flow estimation using biological motion features and random forests**. Sci China Inf Sci, 2023, 66(5): 159401

Keywords: motion estimation; optical flow; motion energy; hardware Random Forests; VLSI hardware system

Shan W W, Cui Y Q, Dai W T, et al. **An efficient path delay variability model for wide-voltage-range digital circuits**. Sci China Inf Sci, 2023, 66(2): 129401

Keywords: modeling; PVT variations; delay variability; digital integrated circuit; FO4 inverter chain

Sun S Y, Li A A, Ding Y T, et al. **A Ka-band calibratable phased-array front-end chip with high element-consistency**. Sci China Inf Sci, 2022, 65(12): 229401

Keywords: Phased-array; phase shifter; attenuator; power amplifier; CMOS; transmit front-end module

Chai Z M, Zhao Y X, Lin Y B, et al. **CircuitNet: an open-source dataset for machine learning applications in electronic design automation (EDA)**. Sci China Inf Sci, 2022, 65(12): 227401

Keywords: EDA; VLSI CAD; Physical Design; Machine Learning; Routability; IR Drop

Li Y C, Wang Y B, Wu D S, et al. **High efficiency dual-band filtering power amplifier**. Sci China Inf Sci, 2022, 65(8): 189401

Keywords: dual-band; filtering; high efficiency; power amplifier; pa; power added efficiency; pae

Deng C C, Zhu M, Yang J J, et al. **An energy-efficient dynamically reconfigurable cryptographic engine with improved power/EM-side-channel-attack resistance**. Sci China Inf Sci, 2022, 65(4): 149404

Keywords: reconfigurable architectures; energy efficiency; cryptographic accelerator; flexibility; side channel analysis

Liu B, Zhang Z L, Cai H, et al. **Self-compensation tensor multiplication unit for adaptive approximate computing in low-power CNN processing**. Sci China Inf Sci, 2022, 65(4): 149403

Keywords: approximate multiplication; tensor multiplication unit; convolutional neural network; self-compensation; addition tree

Li H B, Chen J X, Zhou P G, et al. **A SiGe W-band frequency tripler with 10.5 dBm output power using harmonic suppression technique**. Sci China Inf Sci, 2022, 65(4): 149402

Keywords: sige; w-band; frequency triper; harmonic suppression; transforming

Liu L Q, Yu G H, Du G, et al. **A centripetal collection image sensor (CCIS) based on back gate modulation achieving 1T submicron pixel**. Sci China Inf Sci, 2022, 65(4): 149401

Keywords: image sensor; submicron pixel; back gate modulation; pixel crosstalk; silicon on insulator

Bian R, Meng L B, Wu D R. **SSVEP-based brain-computer interfaces are vulnerable to square wave attacks**. Sci China Inf Sci, 2022, 65(4): 140406

Keywords: electroencephalogram; brain-computer interface; steady-state visual evoked potential; adversarial attack

Li C, Hou Y M, Song R C, et al. **Multi-channel EEG-based emotion recognition in the presence of noisy labels**. Sci China Inf Sci, 2022, 65(4): 140405

Keywords: electroencephalogram; eeg; emotion recognition; noisy labels; capsule network; joint optimization

Jia Z Y, Ji J Y, Zhou X L, et al. **Hybrid spiking neural network for sleep electroencephalogram signals**. Sci China Inf Sci, 2022, 65(4): 140403

Keywords: spiking neural network; electroencephalogram signals; sleep staging

Chen K Q, Chen M Y, Cheng L L, et al. **A 124 dB dynamic range sigma-delta modulator applied to non-invasive EEG acquisition using chopper-modulated input-scaling-down technique**. Sci China Inf Sci, 2022, 65(4): 140402

Keywords: analog-to-digital converter; adc; σΔ modulator; brain computer interface; bci; electroencephalogram; eeg; dynamic range; dr; motion artifacts; ma

Wang C, Hou D B, Zheng S D, et al. **E-band transceiver monolithic microwave integrated circuit in a waveguide package for millimeter-wave radio channel emulation applications**. Sci China Inf Sci, 2022, 65(2): 129404

Keywords: mmic; millimeter-wave; transceiver; microstrip-to-waveguide transition; e-band; radio channel emulator

Cai C, Ning B X, Fan X, et al. **SEU sensitivity and large spacing TMR efficiency of Kintex-7 and Virtex-7 FPGAs**. Sci China Inf Sci, 2022, 65(2): 129402

Keywords: microelectronics; radiation effects; space electronics; radiation tolerance; fpga; reliability

Xu J T, Lin P, Gao Z Y, et al. **A variable threshold visual sensing and image reconstruction method based on pulse sequence**. Sci China Inf Sci, 2022, 65(2): 129401

Keywords: pulse sequence; variable threshold; image reconstruction; visual sensing; adaptive video reconstruction

Wei J S, Zhang J L, Zhang X M, et al. **A neuromorphic core based on threshold switching memristor with asynchronous address event representation circuits**. Sci China Inf Sci, 2022, 65(2): 122408

Keywords: leaky-integration-and-fire; lif; memristor; threshold switching; artificial neuron; aer circuits; asynchronous circuits; on-chip communication

Fang C Z, Ge L L, Tan X S, et al. **Implementation of a concentration-controlled chemical clock**. Sci China Inf Sci, 2021, 64(12): 229401

Keywords: chemical clock; dna strand displacement; mass action kinetics; molecular computing; concentration

Cai L L, Chen W Y, Kang J F, et al. **A physics-based electromigration reliability model for interconnects lifetime prediction**. Sci China Inf Sci, 2021, 64(11): 219404

Keywords: electromigration; modeling; interconnects; time-to-failure; reliability

Huang H, Liu L B, Zhu M, et al. **Fast substitution-box evaluation algorithm and its efficient masking scheme for block ciphers**. Sci China Inf Sci, 2021, 64(8): 189402

Keywords: higher-order masking; hardware security; block ciphers; power function evaluation; substitution-box

Luo L, Dong Z K, Hu X F, et al. **Reconfigurable logic circuit design for stateful Boolean logic computing**. Sci China Inf Sci, 2021, 64(8): 189401

Keywords: memristor; reconfigurable logic circuit; stateful boolean logic; logic design; logic circuit

Zhao K, Li Y F, Wang G X, et al. **A robust QRS detection and accurate R-peak identification algorithm for wearable ECG sensors**. Sci China Inf Sci, 2021, 64(8): 182401

Keywords: signal processing; qrs detection; r-peak detection; wearable ecg sensors; bilateral threshold

Sabor N, Li Y F, Zhang Z, et al. **Detection of the interictal epileptic discharges based on wavelet bispectrum interaction and recurrent neural network**. Sci China Inf Sci, 2021, 64(6): 162403

Keywords: interictal epileptic discharges; epilepsy; discrete wavelet transform; wavelet bispectrum; long short-term memory; recurrent neural network

Wang J J, Bi J S, Liu G, et al. **Simulations of single event effects on the ferroelectric capacitor-based non-volatile SRAM design**. Sci China Inf Sci, 2021, 64(4): 149401

Keywords: see; nvsram; hf0.5zr0.5o2; ferroelectric capacitor; let; remnant polarization; coercive voltage

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Liang Z X, Zhao Y, Wang K F, et al. **Experimental investigation of a novel junction-modulated hetero-layer tunnel FET with the striped gate for low power applications**. Sci China Inf Sci, 2023, 66(6): 169406

Keywords: subthreshold swing; steep-slope; tunnel field-effect transistor; band-to-band tunneling; junction depleted-modulation; adaptive bandgap engineering

Liu F N, Peng Y, Xiao W W, et al. **Impact of polarization switching on the effective carrier mobility of HfZrOx ferroelectric field-effect transistor**. Sci China Inf Sci, 2023, 66(6): 169402

Keywords: mobility; HfZrOx; FeFET; trapping; detrapping; endurance; retention

Yang N, Si Z Z, Wang X H, et al. **Neuromorphic terahertz imaging based on carbon nanotube circuits**. Sci China Inf Sci, 2023, 66(6): 169401

Keywords: CNTs; perception; memory; classification; STT-MTJ; THz

Huang Y, Cao K H, Zhang K, et al. **Implementation of 16 Boolean logic operations based on one basic cell of spin-transfer-torque magnetic random access memory**. Sci China Inf Sci, 2023, 66(6): 162402

Keywords: in-memory computing; logic operation; magnetic tunnel junctions; transistor; spin transfer torque

Wu Y, Deng W J, Chen X Q, et al. **CMOS-compatible retinomorphic Si photodetector for motion detection**. Sci China Inf Sci, 2023, 66(6): 162401

Keywords: retina; photodetector; motion detection; bio-inspired; in-sensor computing

Wang C X, Yu H, Wang Y C, et al. **Modeling and physical mechanism analysis of the effect of a polycrystalline-ferroelectric gate on FE-FinFETs**. Sci China Inf Sci, 2023, 66(5): 159403

Keywords: FEFET; polycrystalline-ferroelectric; statistical variability; multi-grain model; TCAD simulation

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