

PhD Topic Overview for 2027

This document provides an overview of the PhD topics planned for the 2027 PhD call.

At this stage, only the PhD topic reference code and title are shown. Full topic descriptions and application details will be available when the call opens on November 10th, 2026.

Ref-code	Title
2027-001	Template-Assisted, BEOL-Compatible Crystallization of Sub-4 nm Ferroelectric HZO via Seed-Layer Engineering for FeRAM
2027-002	High-density optical RDL on photonic interposers using out-of-plane coupling structures
2027-004	Unraveling Next-gen 3D NAND Flash Through Model-Driven Experiments
2027-005	Photonic quantum control systems for scalable neutral atom quantum computing
2027-006	Nanoscale electrochemistry of materials and devices for next-generation semiconductor technology
2027-007	Hyper NA EUV: Ultra-Thin Resist Materials and Imaging in the Angstrom Era
2027-008	Electrokinetic extraction and manipulation of neurotransmitters in micro- and nanofluidics for integration with neural probes
2027-009	Investigation of defects and their capture cross-sections with first-principles
2027-010	PhD position in mechanics: Modeling of 3-D chip bonding
2027-011	Thermal and Mechanical Co-Design of Future Chiplet Systems Using Physics-Informed Machine Learning
2027-012	CMOS-Integrated Beamforming Architectures for Next-Generation PMUT Arrays
2027-013	Design of Neuromorphic Mixed-Signal Integrated Circuits for Multi-Analyte Implantable Biosensor Arrays
2027-014	Understanding High Optical Power Induced Degradation Mechanisms in Si Photonic Devices
2027-015	Upscaling physics simulations at system-level with AI and finite elements
2027-017	Low-temperature Diamond Thin Films: A New Approach to Cooling Future Chips
2027-018	On-Chip Protein Separation and Enrichment
2027-020	High speed modulator design and characterization
2027-021	Physics-Informed AI and 3D Computational Lithography for Next-Generation High-NA EUV Patterning
2027-024	Reliability Physics and Degradation Mechanisms of Advanced Integrated Photodiodes for Silicon Photonics
2027-025	Mechanical integrity of BEOL and 3D interconnects by nanoindentation
2027-026	Solid-State Gain Integration for Cold Atom and Trapped Ion Modulators
2027-027	[NanolC] Reliability of semiconducting oxides: the last roadblock for memory applications
2027-028	Neuromorphic compression and telemetry ASICs for humanoid tactile sensing applications
2027-029	Reliability of high-k dielectrics for 2.5D MIM capacitor applications
2027-030	CMOS-Compatible Solid-State Electrolytes
2027-032	Thin-Film Deposition of Prussian Blue Analogue based room temperature Magnets
2027-033	DNA Purification-on-a-chip via electrified polarization of nanostructures
2027-034	Electrolytic abatement of gas contaminants on gas diffusion electrodes
2027-035	Silicon-Calibrated Interconnect Reliability & Aging Digital Twins with Sensor-Embedded Test Chips for Workload-Aware Systems
2027-036	Microfluidic Gradient Titration: A Lab-on-Chip Platform for Continuous Chemical Analysis
2027-038	Freestanding Aligned Carbon Nanotube FETs for Active Single-Molecule Biosensing
2027-039	Continuous Optimization of Agentic Workloads on Heterogeneous AI Systems
2027-040	Molecular Orientation and Layer Formation in SoS-Deposited Organic/Perovskite Solar Cells
2027-041	Oxygen-Controlled Printing and Interfacing of Liquid Metals for Reliable Robotic Electronic Skins
2027-042	Voltage-controlled exchange coupling for next-generation low-power MRAM
2027-043	Non-aqueous electrodeposition chemistry for superconducting and advanced materials
2027-044	Electrochemically induced deposition of functional silica nanocomposite dielectrics for semiconductor devices
2027-045	[NanolC] Reliability characterization of CMOS 2.0 nodes using low-frequency noise
2027-046	Next-Generation III-V Modulators for Energy-Efficient Optical I/O
2027-047	Hetero-integration of two-dimensional electronic materials for active memory applications
2027-049	Ultrafast, Multiplexed EUV Scatterometry for Device Metrology in the Ångström and Quantum Technology Eras
2027-050	On-chip Tunable UV Lasers Based on the AlOx Photonic Platform

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2027-051	AI-driven multi-agent orchestration for distributed cloud-edge applications
2027-052	Scalable Microarchitecture for Heterogeneous Quantum Processors
2027-053	Unraveling the origins of strain variability in NS and CFET transistors through advanced TEM and EELS
2027-054	Rydberg Quantum RF Receivers for Radar, Localization and Wireless Communication
2027-056	Towards 4D Spatial Omics in Organ-on-Chip platforms
2027-057	Gate Stack Engineering for 2D FETs Using Through-Dielectric Ionic Currents
2027-058	Beyond CMOS: Repurposing CFET Fabrication Modules for Next-Generation NEMS Devices in Ultra-Low-Energy Compute
2027-059	Near/In-sensor AI for Physical AI
2027-060	Lipid Membrane-Based Synthetic Neurons for Neuromorphic Sensing
2027-061	Explainable Causal-Neurosymbolic AI for Process Analysis and Optimization in Semiconductor Manufacturing
2027-062	Deterministic Robotic E-Skin Networks
2027-063	Novel III-V microlasers for artificial intelligence and optical interconnects applications
2027-064	Unified Acoustical Radios and Protocols Designs for Underwater Communication, localization and Sensing
2027-066	Spin-Controlled Photoelectrocatalytic CO ₂ Reduction via Chiral Perovskite (CHP)-Induced Spin Selectivity
2027-067	AI/ML for Predictive Closed-Loop Neuromodulation in HW-Constrained Architectures
2027-069	Dynamic Immune Monitoring in Microphysiological Systems through Integrated Biosensing
2027-070	Microvalve-Based Platforms for Precision Biomechanical Stimulation of Living Systems
2027-071	Advancing Organoid Research through 3D Micro-Electrical Impedance Tomography for Dynamic, Label-Free, and Non-Invasive Phenotyping
2027-072	A Silicon Micromesh Biosensing Platform for Blood-Brain Barrier Inflammaging-on-Chip Models of Neurodegeneration and Drug Discovery
2027-073	Advancing AI-driven spectral material detection under varying illumination conditions
2027-074	Robust robot planner for FOUP transport in human shared cleanrooms.
2027-075	Physics-Guided Quantitative Liquid-EM of Lipid Nanoparticles
2027-076	Neuro-inspired all-optical signal equalization
2027-077	Ultrafast dynamics of thin film LEDs and lasers
2027-078	[NanoIC] Metrology and Defectivity Study in 3D Patterning Processes
2027-079	Ternary-blend Halide Perovskites for Thin-Film Photonic Devices: From Photodetectors to LEDs and Lasers
2027-080	Chemically-tuned 2D materials for next-generation nanoelectronics using first-principles quantum transport modeling
2027-082	Liquid AI Business Models
2027-083	Optimising Workload DAGs for a Work-Stealing AMT: A Compiler for the DVM
2027-084	Joint Compute and Connectivity Orchestration for Distributed 6G Systems
2027-085	[NanoIC] Inline metrology with Atomic Force Microscopy: from homogeneous smooth surfaces to high-aspect-ratio multi-material devices
2027-086	[NanoIC] Advancing Ultrasonic Inspection for Voids in Heterogeneously Integrated Semiconductor Devices
2027-087	[NanoIC] Revealing the Structure-Composition Role on Ultrafast Carrier Dynamics in Advanced Logic and Memory Devices
2027-088	6G-Enabled Distributed Intelligence for Humanoid Robotics: Joint Computing and Connectivity across Robot and Environment (Edge)
2027-089	Industrial Vacuum Processing of Perovskites and Interlayers for Large-Area Monolithic Perovskite/Silicon Tandem Solar Cells
2027-091	Learning to Perceive in Degraded Environments
2027-092	CMOS-Compatible MEMS and Photonic Sensors for Wafer-Surface Plasma Diagnostics
2027-093	Distributed FlexIC Architectures for Smart Surfaces and E-Skins
2027-094	AI-Native Control and Optimization of Integrated Terrestrial and Non-Terrestrial Networks
2027-095	High-Fidelity Control and Readout in SiGe Spin Qubits
2027-096	Single-Molecule Patterning of Biointerfaces via DNA Origami
2027-097	CMOS-integrated 2D-fluidics for programmable single-biomolecule transport and sensing
2027-098	Molecular Cooling: Endothermic Chemistry for Next-Generation Chip Thermal Management
2027-099	Thin-Film Ferroelectrics for Low-Loss Quantum Microwave Devices
2027-100	Low-Loss and Electrically Addressable Phase-Change Materials for Programmable Nanophotonic Devices

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2027-101	Hardware-Software Co-Design for Efficient Knowledge-Graph-Based AI Agents
2027-102	Closed-Loop Control of Visible Hybrid Photonic Systems
2027-103	Revealing In-operando band structure dynamics in next generation 2D TMD semiconductor devices: Correlating gate-induced band structure changes with device performance.
2027-105	Material Development of Antimonide Low-Noise Amplifiers for Qubit Read-Out
2027-106	RF Interposer, Electronic, and Photonic Co-Design for AI-Scale Co-Packaged Optical Interconnects
2027-107	Antenna-in-Package and Heterogeneous Integration for Sub-THz Wireless Systems
2027-110	Data-driven multi-fidelity surrogate modeling for accelerated materials discovery
2027-113	CMOS Integrated Readout and Control Circuits for Closed-Loop Bio-Photonic Systems
2027-114	Acoustic RF filters for Next-Generation Wireless Communications
2027-115	In-situ monitoring for workload-dependent variability in AI digital circuits
2027-117	MEMS Phase Shifters for Reconfigurable Photonic Integrated Circuits
2027-118	Thin-Film Ga ₂ O ₃ for Next Generation Deep-UV Sensing
2027-119	[NanoIC] Revealing Yet-Unknown Manufacturing Defects in Advanced Semiconductor Technologies
2027-120	Programmable photolithographic peptide synthesis
2027-122	Innovating GaN Power HEMTs: The Next Step
2027-123	Freeform nano-optics for Extreme Ultraviolet (EUV) Inspection and Metrology
2027-124	PhD position in Excitable Hopfield Networks
2027-125	Computational optics for MIR sensing
2027-126	Acoustic Control of Two-Phase Microflows for Advanced Electronics Cooling
2027-128	Towards High-Endurance fast-erase 3D FeFETs with OSC channel
2027-129	Towards Predictive Reliability: Correlative Characterisation of Buried Interfaces in Emerging Thin-Film Materials and Devices
2027-130	Learning the Behaviour of Future HPC Systems: Predictive Modelling and Hardware–Software Co-Design
2027-131	Co-integration of quantum systems for high-bandwidth entanglement distribution
2027-132	Nucleic acid synthesis and intracellular delivery on microelectrode arrays.
2027-133	Micro-transfer Printing of STO for Scalable Quantum Photonics
2027-134	Cryogenic Optical Interconnects for Quantum Computing
2027-135	Guided Integrated Phononics
2027-136	Ion-gated Neuromorphic architectures with Prussian Blue Analogs
2027-137	Piezoelectric Switches for Optically Addressable Qubits
2027-138	NextGen2: Next-generation multiwire interconnection for next-generation sustainable and lightweight solar modules
2027-139	Chiral spintronics based on Au-SAM heterostructures.
2027-140	Organic Chiro-Optical devices
2027-143	Solid-state redox catalysts for electrochemical PFAS abatement
2027-147	High-throughput electrokinetic nanoparticle manipulation: Dealing with sub-10 nm nanoparticle contamination in advanced CMOS processing
2027-148	Automated Architecture-Agnostic Synthesis of Wideband Load-Modulated RF GaN Power Amplifiers
2027-149	Programmable ionic liquid nano-chambers for DNA electrochemical synthesis
2027-150	Physics-Informed Machine Learning for Predictive MEMS Manufacturing
2027-151	Cross-technology co-optimization of the memory sub-system for Multi-Agent LLM Serving
2027-152	Oxidation of two-dimensional (2D) transition metal dichalcogenide crystals for future nano-electronic devices: Anisotropic reactivity and selectivity
2027-155	AI-assisted High-Framerate Speckle Image Analysis
2027-156	Low-Dark-Current MWIR Thin-Film Photodetectors for Integrated Photonic Systems
2027-157	Mixed-signal compensation and calibration techniques for high-speed DACs
2027-160	Ultra-Low-Loss Fiber-to-Chip Coupling for Next-Generation Photonic and Quantum Systems
2027-162	Sunlight into Fuels: Interface and Cocatalyst Engineering of Earth-Abundant Photoelectrodes for Solar-Driven Chemistry
2027-163	Novel Qubit Readout for Scalable Quantum Computing
2027-164	Backside integrated charge pump technology for high-current-density AI applications

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2027-165	Advanced Characterization of Ultra-Scaled 2D Transistors for Future CMOS Technologies
2027-167	Flexible transceiver architectures for FR3 and NTN applications
2027-169	[NanolC] Circuit design exploration for quasi-adiabatic compute in the most advanced technology nodes
2027-170	Interfacing Biological and Solid-State Nanopores for Scalable Single-Molecule Sensing
2027-172	Speckle-based cloud sensing for adaptive multi-band optical satellite downlinks
2027-174	Solid-State Ionic Gating of Emerging Low-Dimensional Semiconductors for CMOS Applications
2027-175	Area-selective deposition (ASD) of dielectrics on chemically similar substrates for 3D memory devices
2027-176	PhD position in electronics cooling; Engineered nanostructured surfaces for improved immersion cooling solutions with applications to HPC/AI data centers
2027-177	Understanding the surface chemistry of amorphous carbon materials to enable area-selective atomic layer deposition on complex 3D integration architectures
2027-178	RF TX impairment minimization through the optimal use of configurable analog and digital equalization in RF DACs
2027-179	Advancing Ultra-Thin Molecular Layer Deposition Resists for Hyper-NA EUV Lithography
2027-180	Advanced AFM-based metrology and data-driven modelling for IGZO-based 3D memory devices
2027-181	Integrated photonics-based structured illumination for single molecule analysis
2027-182	[NanolC] Design-Technology Co-Optimization for embedded and heterogeneously integrated devices in future semiconductor systems
2027-183	Module-level printed interconnection for Si/CIGS/Pk modules designed for recycling
2027-184	Power devices cointegrated on package/chip or BEOL
2027-188	AI-based PDK-aware power modeling flow for computing architectures

More information

If you have any questions, you may find the answer on our [FAQ page](#), where we have collected the most common questions.

If not, you are always welcome to reach out to us via phd@imec.be.

We look forward to receiving your application once the 2027 call opens.