Best Top-Score Paper Award

D-Track

ACP2026-0701-63

Inverse-designed Waveguides Enable Sub-picometer Resolution Spectrometer over 700nm Bandwidth

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We demonstrate a compact and high-performance on-chip spectrometer. By employing inverse design along the sidewalls of a single waveguide, this chip achieves a record full-width at half-maximum of 0.25 pm and an operation bandwidth over 700 nm.

N-Track

ACP2026-0626-10

Inverse-Designed Meta Processing Units for Task-aware Photonic Computing Systems

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Photonic matrix processors require compact, composable operators for task-aware computing. Here, we demonstrate inverse-designedmeta processing units (MPUs) with coherent matrix cascading, hardware-in-the-loop dual-task learning, and neuron-level sharing, reducing programmable-mesh burden while preserving task-specific adaptation.

T-Track

ACP2026-0701-229

Photonic Integrated Complementary Carrier-Extracted Self-Coherent Receiver Enabled by Add-drop Resonators

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Based on the bandpass and bandstop characteristics of the add-drop racetrack resonators, we

demonstrate an integratedcomplementary carrier-extracted self-coherent receiver on the silicon photonic platform, achieving 360-Gb/s data rate over 50-km SSMF.

NP-Track

ACP2026-0714-20

Coherent spin-photon interface of single PL6 color center in silicon carbide

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In this talk, I will presentour investigation of the oxygen-vacancy PL6 color center in 4H-silicon carbide as a coherent spin–photon interface. Although PL6 has recently emerged as a promising platform for quantum information processing, its spin–photon propert ieshave remained largely unexplored. I will first show how we combine group-theoretical modeling with strain-dependent photoluminescence excitation spectroscopy to fully resolve the excited-state fine structure. Using resonant excitation, we achieve a spin initialization fidelity of 99.69 ± 0.03% and a readout contrast of 98.31 ± 1.03%. The spin–photon entangled A2 transition exhibits narrow optical linewidths of about 180 MHz and a polarization visibility of ~82%. I will then discuss coherent optical driving, where we obtain Rabi frequencies up to 2.895 GHz—approximately 130 times the optical saturation power. Finally, by applying dynamical decoupling, we extend the spin coherence time from 0.5 ms to 5.70 ms, a ten-fold enhancement. Our results establish the PL6 center as a competitive solid-state spin–photon interface hosted in a commercially available semiconductor platform, combining near-unity initialization, high-speed coherent control, and millisecond-scale coherence without isotopic purification.