

Interferometer meshes for novel optical sensing and measurement

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Integrated Mach-Zehnder interferometer mesh circuits allow arbitrary, programmable and self-configuring linear optical operations on incident light. These have many potential uses for measuring and processing light itself in ways beyond previous optical systems. Examples proposals include: reference-free measurement of amplitude and phase profiles; generation of arbitrary beams; measurement and separation of multi-mode partially coherent light and the single-photon density matrix; automated modal analysis of entanglement; high-rejection modal spatial filtering, e.g., for separating exoplanet and star light; automatically finding the best low-crosstalk communication channels through any optical system or scatterer; and novel self-configuring and arbitrarily programmable spectrometers.