A crucial yet unavailable component in high-performance photonic integrated circuits (ICs) and other chip-scale photonic systems is an on-chip light source that is efficient, economical, silicon-compatible, and electronically addressable. In this talk, I will cover two types of light sources – III-V nanoLEDs and perovskite microlasers – that have the potential to be inserted into photonic ICs, as well as luminescent hyperbolic metamaterials that can lead to highly polarized light sources with fast emission rates. I will further discuss emerging physics and applications enabled by these material systems, including topological states for robust data transport, and all-dielectric hyperbolic metamaterials for super-resolution imaging.

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