Subwavelength-Scale Lasing: Physics and Technology of Nanolasers

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Sixty-five years of laser research and applications have pushed the limits of almost all laser parameters to their extremes: from wavelengths, pulse width, and size of a laser, to output power. This talk focuses on recent efforts to shrink the size of a laser down to the smallest limit, at sub-wavelength scales. The question of how small a laser can be made is important both for fundamental laser physics and for many technological applications. The quest for the ultimate size limit of a laser has led to various ideas for confining photons to the smallest possible scales using mechanisms such as surface plasmons. Understanding the behaviour of nanolasers has also led to a re-examination of basic issues in laser physics, such as linewidth, quantum fluctuation, laser threshold, *etc.* Technologically, nanolasers are expected to become important light sources for future photonic chips or to serve as strongly localised nanoprobes for biomedical or biomolecular applications. The history, current status, and future prospects of many aspects of nanolasers will be discussed in detail.