

CONDENSED MATTER PHYSICS SEMINAR

Monday 23 September at 14:30

Simpkins Lee seminar room

‘Plasmonic Terahertz Optoelectronics’

[Mona Jarrahi](#)

*Professor and Northrop Grumman Endowed Chair in Electrical and Computer Engineering,
University of California Los Angeles*

Although unique potentials of terahertz waves for chemical identification, material characterization, biological sensing, and medical imaging have been recognized for quite a while, the relatively poor performance, higher costs, and bulky nature of current terahertz systems continue to impede their deployment in field settings. In this talk, I will describe some of our recent results on developing fundamentally new terahertz electronic/optoelectronic components and imaging/spectrometry architectures to mitigate performance limitations of existing terahertz systems. In specific, I will introduce new designs of high-performance photoconductive terahertz sources that utilize plasmonic nanoantennas to offer terahertz radiation at record-high power levels of several milliwatts – demonstrating more than three orders of magnitude increase compared to the state of the art. I will describe that the unique capabilities of these plasmonic nanoantennas can be further extended to develop terahertz detectors, focal-plane arrays, and heterodyne spectrometers with quantum-level detection sensitivities over a broad terahertz bandwidth at room temperatures. To achieve this significant performance improvement, plasmonic antennas and device architectures are optimized for operation at telecommunication wavelengths, where very high power, narrow linewidth, wavelength tunable, compact and cost-effective optical sources are commercially available. Therefore, our results pave the way to compact and low-cost terahertz sources, detectors, and spectrometers that could offer numerous opportunities for e.g., medical imaging and diagnostics, atmospheric sensing, pharmaceutical quality control, and security screening systems.

Host: Professor Michael Johnston