Condensed Matter / Biophysics Seminar

Terahertz radiation from Bi2Sr2CaCu2O8 interlayer Josephson junctions: Progress and future applications

Thursday

January 29

4:00 P.M.

Rm 184 NSH

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At present, no bright compact sources of coherent radiation exist in the range from approximately 0.5 THz to 1.3 terahertz. This region is of particular interest for a range of scientific, medical, and security-related applications. Stacks of intrinsic Josephson junctions in extremely anisotropic high-temperature superconductors are one of the most promising candidate devices in this frequency range. In order to generate practically useful levels of power from these stacks, it is necessary to obtain efficient phase-synchronized emission from the largest possible number of individual Josephson junctions. Following this approach, we have recently at Argonne increased the coherent power output from this type of device to 0.6 milliwatts at 0.51 THz. This development opens possibilities for new types of instruments for THz imaging, detection, and spectroscopy. Furthermore, electronics based on intrinsic Josephson junctions could be employed for ultra-high bandwith communications at THz frequencies, in both wired and wireless applications.