**Trapping and slowing down photons using black holes in silicon for datacom, sensing, and energy conversion**

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**Abstract**

Photon-material interaction is generally very weak in most semiconductors when incident photon wavelengths are close to their optical band gap. This leads to very weak absorption coefficients requiring considerably thick semiconductor films for efficient light absorption. However, a photodetector designed with thick absorption region cannot operate at high-speed due to long carrier drift-time. In this presentation, we will demonstrate a technique to bend normally incident beams of light by almost ninety degrees into laterally propagating modes of light along the plane of semiconductor films by using a periodic array of micro and nanoscale holes. Such structures bend light beams, slow them down and contribute to unprecedented improvement in the light absorption efficiency in devices, even when they are designed with very thin absorption regions. This opens new application opportunities such as ultra-fast CMOS compatible photodiodes for datacenter communication links, LIDAR, advanced bio imaging and sensors and highly efficient solar cells.

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**A picture containing person, tree, outdoor, person

Description automatically generatedBio:** Saif Islam received his B.Sc. Degree in Physics from Middle East Technical Univ, M.S. degree in Physics from Bilkent Univ and Ph.D. degree in Electrical Engineering from UCLA in 2001. He worked for JDS Uniphase Corp, and HP Labs. He joined UC Davis in 2004, where he is a Professor in the ECE Department. He authored/co-authored more than 270 scientific papers, organized 32 conferences as a co-chair; and holds 42 patents as an inventor/co-inventor.

Dr. Islam received NSF CAREER Award, Outstanding Junior and Outstanding Mid-Career Research Faculty Award, IEEE Professor of the Year and UC Davis Academic Senate Distinguished Teaching Award. He is a fellow AAAS, OSA, SPIE, IEEE and National Academy of Inventors (NAI).