

## **“Inverse Designed Integrated Photonics”**

### **Abstract:**

Photonics with superior properties can be implemented in a variety of old (silicon, silicon nitride) and new (silicon carbide, diamond) photonic materials by combining state of the art photonics optimization techniques (photonics inverse design) with new fabrication approaches. In addition to making photonics more robust (e.g., to errors in fabrication and variation in temperature), more compact, and more efficient, this approach can also enable new functionalities. While in our early work we focused on inverse design and demonstration of individual photonic devices, our more recent work focused on scaling it to photonic integrated circuits. We illustrate this with several examples, including optical interconnects based on a combination of mode and wavelength division multiplexing, on chip particle accelerators, and diamond and silicon carbide photonic circuits.

### **Bio:**

Jelena Vučković (PhD Caltech 2002) is the Jensen Huang Professor in Global Leadership in the School of Engineering, and Professor of Electrical Engineering and by courtesy of Applied Physics at Stanford, where she leads the Nanoscale and Quantum Photonics Lab. She is also the chair of the electrical engineering department at Stanford, and was the inaugural director of Q-FARM, the Stanford-SLAC Quantum Science and Engineering Initiative. Vučković has received many awards including the James Gordon Memorial Speakership from the OSA (2020), the IET A. F. Harvey Engineering Research Prize (2019), Distinguished Scholar of the Max Planck Institute for Quantum Optics - MPQ (2019), Hans Fischer Senior Fellowship from the Institute for Advanced Studies in Munich (2013), Humboldt Prize (2010), DARPA Young Faculty Award (2008), and Presidential Early Career Award for Scientists and Engineers (PECASE in 2007). She is a Fellow of the American Physical Society (APS), of the Optical Society of America (OSA), and of the Institute of Electronics and Electrical Engineers (IEEE).