Physics Colloquium, University of South Florida
3:00 pm, Friday, Mar. 13th, 2020, ISA 2023
Refreshment available

Extreme Nonlinear Optics in Semiconductor and Atomic Systems

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This talk presents an overview of our recent work on the interaction of ultrashort, high-intensity terahertz pulses with semiconductor materials and atomic systems. After a brief introduction to the field of extreme nonlinear optics in atoms and solids, the basic ingredients of the microscopic semiconductor modelling are summarized. Examples of successful theory-experiment comparisons are discussed, including the generation of very high harmonics, dynamical Bloch oscillations, internal quantum interference effects, quasiparticle collisions, as well as lightwave valleytronics in TMDCs.


Work done in collaboration with: M. Kira, Univ Michigan/USA, U. Huttner et al., Univ. Marburg/Germany (theory) and R. Huber et al., Univ. Regensburg/Germany (experiments).

Dr. Koch received his M.S. and Ph.D. in Physics from J.W. Goethe-University in Germany. He is currently a Senior Professor at the Philipps-University, Marburg/Germany and is also an Adjunct Professor at the University of Arizona, Tucson/AZ, College of Optical Sciences Center. He is a renowned scholar in condensed matter theory, optical and electronic properties of semiconductors, many-body interactions, semiconductor quantum optics, quantum confinement in solids, coherent and ultrafast phenomena, semiconductor laser theory. Dr. Koch has more than 900 publications in scientific journals and books, has authored or co-authored of 8 text and research books, and served as the editor of 3 books. He has more than 22,000 citations with a H-index of 77. He has received many international awards, including the Leibniz Prize of the Deutsche Forschungsgemeinschaft in 1997 and the Max Planck Research Award of the Alexander von Humboldt Foundation and of the Max Planck Society in 1999. Dr. Koch is a fellow of the Optical Society of America and a Heisenberg Fellow of the Deutsche Forschungsgemeinschaft. He currently serves in the editorial board of Laser & Photonics Reviews.