Advances in ultrashort pulse generation from Kerr resonators

University of Rochester, USA

William H Renninger
Email: william.renninger@rochester.edu

Kerr resonators are a flexible alternative for ultrashort pulse generation in robust waveguide cavities. This talk discusses Kerr resonator techniques for achieving the high pulse energies and short durations most desired for applications. In fiber cavities, two novel Kerr resonator solutions will be discussed, the stretched pulse and chirped pulse solitons. The 'stretched pulse' soliton is characterized by stretching and compressing periodically in the cavity with large compression ratios, and enables the shortest femtosecond pulses to date from fiber cavities. The chirped pulse soliton is a new type of soliton which exists in normal dispersion cavities and enables a wide new range of pulse wavelengths as well as very high pulse energies and conversion efficiencies in addition to a unique immunity to cavity loss. Finally, we explore advances in on-chip Kerr resonators in microrings, including a demonstration of record output pulse energy for femtosecond single solitons from a silicon nitride device.

Short Bio:

Will Renninger is an Associate Professor of Optics and Physics at the University of Rochester. Previously he was a postdoctoral research associate in the Department of Applied Physics at Yale University after receiving his PhD degree in Applied Physics from Cornell University. His group's research interests include ultrafast nonlinear optics for applications such as bio-imaging; light-sound interactions for applications including RF-photonics and quantum computing; and photonic computing platforms for studying the brain and improving the efficiency of large-scale information processing.