



Seminar Announcement

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Green Hall, Room 0120
3:00 PM

Single Mode Supersymmetric Laser Arrays

Abstract: Parity time reversal (PT) symmetry has been a subject of intense investigations for the last few years [1]. PT symmetric photonic structures represent a sub-class of non-Hermitian photonic arrangements and they exhibit a wealth of intriguing effects [2]. On the other hand, the notion of discrete supersymmetry (DSUSY) has been only recently introduced to the research field of optics [3].

In this talk I will show that combining non-Hermiticity and supersymmetry can be employed to solve a long standing problem in laser engineering, namely that of building single mode laser arrays that exhibit a regular temporal behavior [4]. In particular I will present results from our recent work on one dimensional supersymmetric laser arrays and I will discuss a special technique that can be employed to extend these ideas to higher dimensions where DSUSY transformations fails.

References

- [1] C. M. Bender, and S. Boettcher, Phys. Rev. Lett. 80, 5243 (1998).
- [2] C. E. Ruter, K.G. Makris, R. El-Ganainy, D.N. Christodoulides, M. Segev, D. Kip, Nature Physics 6, 192 (2010).
- [3] M.A. Miri, M. Heinrich, R. El-Ganainy and D.N. Christodoulides, Phys. Rev. Lett. 110, 233902 (2013).
- [4] R. El-Ganainy, Li Ge, M. Khajavikhan, D. N. Christodoulides, Phys. Rev. A, 92, 033818 (2015)

Bio: Ramy El-Ganainy received his PhD, in 2009, from College of Optics and Photonics (CREOL), University of Central Florida. Afterwards, he spent few years as a postdoctoral fellow at the University of Toronto and the Max Planck Institute for the physics of complex systems. He is currently an assistant professor at the Department of Physics, Michigan Technological University (MTU) where he is also affiliated with the Henes Center for Quantum Phenomena. His research work focuses on investigating complex light wave dynamics.