The generation of a Quasi-single-cycle pulse is a goal in many applications experiments involving in High Harmonic Generation (HHG) and Attosecond Sciences. As the demand for ultrafast laser facilities has grown, the techniques and availability of materials have changes the design challenges in building an Optical Parametric Chirped Pulse Amplification (OPCPA) laser facility. The concepts and challenges are discussed in detail in the development of two laser systems built by the Laser Plasma Laboratory, HERACLES and PhaSTHEUS. This dissertation also gives insight to the challenges that are encountered in other cutting edge OPCPA laser facilities. An overview of the design challenges that need to be addressed in any OPCPA laser facility either high energy or high average power that is suitable for high intensity laser physics is discussed in this dissertation.

Educational Career:
Bachelor's of Electrical Engineering, BS, 2010, University of Central Florida
Master's of Optics and Photonics, MS, 2013, University of Central Florida

Committee in Charge:
Martin, Richardson, Chair, EECS-CREOL
Matthieu, Baudelet, Chemistry
Lawrence, Shah, Luminar Technologies, Inc.
Patrick, Likamwa, EECS-CREOL
Peter, Delfyett, EECS-CREOL

Approved for distribution by Martin, Richardson, Committee Chair, on June 20, 2018.

The public is welcome to attend.