Chapter 7

Conclusion

In conclusion, this work applies nonlinear optical techniques to significantly higher photon energies than before, enhancing the conversion efficiency and opening up the possibility of generating multi-keV photon energies from high harmonic generation. The ideas in this work have the potential to greatly increase the number of applications possible using HHG in many areas of chemistry and biology by making it a practical, efficient, table-top light source. The enhancements demonstrated in this work are still far from the theoretical limits. Future work on quasi-phase matching over longer fiber lengths and using shorter modulations should improve the photon flux from HHG even further. Quasi-phase matching techniques may also provide a means of generating an enhanced attosecond duration pulse of high harmonic light. Currently, high harmonic generation is the only method for generating light pulses of durations in the attosecond regime (1 attosecond = 10^{-18} seconds). Already, initial experiments have been performed using light from HHG to measure electronic processes on attosecond time scales. Therefore, the advances demonstrated in this work have the potential to influence both technology and fundamental science.