Current Progress in XUV frequency combs

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In the field of high precision spectroscopy, frequency combs have been an indispensable tool for phase coherently linking the frequency of laser with the radio frequency domain. This enables direct counting of optical frequencies. The measured transition frequency in simple atomic system like the hydrogen 1S-2S transition, allows for precise tests of bound state quantum electrodynamics (QED). So far, the applications of frequency combs have been limited to wavelengths longer than the visible region. This is due to limitations from available mode-locked lasers and possible frequency conversions. For precision spectroscopy of charged systems like He^+, which is more sensitive to higher-order QED corrections, a frequency comb will be required in extreme ultra-violet (XUV). In order to obtain a high power frequency comb in the XUV region, cavity assisted high harmonics generation is expected to be a promising tool. In this talk, our recent work and future plans towards high precision spectroscopy with XUV frequency combs will be presented. In addition, recent investigations on several possible techniques to further improve the output power of XUV frequency combs, such as Non-Collinear High Harmonics Generation (NCHHG) and high repetition rate phase-stable amplifiers, will be discussed.