

Locking optical frequency comb with a GPS controlled Cs clock

Z. Wei, H. Han, W. Zhang, D. Li, L. Wang, N. Shen, Y. Nie

Joint Laboratory of Advanced Technology in Measurements, Beijing National Laboratory for Condensed Matter Physics /Institute of Physics, Chinese Academy of Sciences, Beijing 100080, China

We developed an optical frequency comb based on the home-made femtosecond Ti sapphire laser at a repetition rate of 90MHz, offset frequency at a signal noise ratio of 45dB was measured with the self-reference technique. By locking the offset frequency to the repetition rate frequency, we controlled the relative frequency fluctuation within 1Hz. Further locking the repetition rate to a Cs clock controlled with a frequency signal which is received from Global Position System (GPS), a long-term stabilization of 6×10^{-14} was demonstrated. To pursue the new frequency comb worked at the XUV range by high order harmonic generation, we also developed a new femtosecond oscillator only with three chirped mirrors and a 10% output coupler, pulse duration of as shorter as 7fs was directly generated, which shows an even simplest laser resonator for few cycles pulse generation. Presently we used the frequency comb to measure and compare the actual frequency of an iodine-stabilized 532nm laser, an enhanced resonator pumped with the 7fs Ti:sapphire laser for XUV comb is being establish.