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Towards Precision Measurement of the 2^1S_0 -3^1D_2 Two-Photon Transition in Atomic Helium. YI-JAN HUANG, YU-CHAN GUAN, Institue of Photonics Technologies, National Tsing Hua University, TE-HWEI SUEN, LI-BANG WANG, Department of Physics, National Tsing Hua University, JOW-TSONG SHY, Institue of Photonics Technologies, National Tsing Hua University — We intend to accurately measure the frequency for 2S-3D two-photon transition and to deduce the 2S ionization energy to an accuracy below 100 kHz from the theoretical calculation of the 3D state. In this talk, we present a precision measurement of the 2^1S_0 -3^1D_2 two-photon transition in atomic helium at 1009 nm. A master oscillator power amplifier (MOPA) is seeded by an external cavity diode laser (ECDL) is constructed to generate more than 700 mW laser power with TEM00 beam profile at 1009 nm. To observe the two-photon transition, a helium cell is placed inside a power enhancement optical cavity and the helium atoms at 2^1S metastable level are prepared by a pulsed RF discharge and monitor the 668 nm 3^1D_2 to 2^1P_1 fluorescence after RF discharge is turned off . The absolute frequency metrology of the ECDL is carried out by an Er-fiber optical frequency comb (OFC). The two-photon spectrum is obtained by tuning the repetition frequency of the OFC. The 2^1S_0 -3^1D_2 frequency is determined to be 594414291.967 (80) MHz in He-4. More results will be presented at the annual meeting.

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