

# The Three Corner Hat Measurement of Three Hydrogen Masers in Remote Locations via Fiber Based Frequency Synchronization Network

C. Gao<sup>1,2,3</sup>, B. Wang<sup>1,2</sup>, X. Zhu<sup>1,3</sup>, J. Miao<sup>1,3</sup>, Y. Bai<sup>1,3</sup>, T. C. Li<sup>1,4</sup>, and L. J. Wang<sup>1,2,3,4</sup>

<sup>1</sup>Joint Institute for Measurement Science, Tsinghua University, Beijing 100084, P. R. China

<sup>2</sup>The state key lab of precision Measurement Technology and Instrument, Department of Precision Instruments, Tsinghua University, Beijing 100084, P. R. China

<sup>3</sup>Department of Physics, Tsinghua University, Beijing 100084, P. R. China

<sup>4</sup>National Institute of Metrology, Beijing 100013, P. R. China

Email: bo.wang@tsinghua.edu.cn

Atomic clocks in the same place always affected by common environments, such as temperature, humidity, gravity and so on. Consequently, certain correlations always exist between these clocks. A coordinated frequency generated by several remote clocks can remove these correlations, and can also improve the reliability and availability of timekeeping system. Thanks to the precise fiber based frequency dissemination techniques developed recently, from 2013, we start the program of Beijing regional time and frequency network. Currently, Tsinghua University (THU), the Changping site of National Institute of Metrology (NIM-Changping), and Beijing Institute of Radio Metrology and Measurements (BIRM) have been linked and synchronized via the fiber network (Fig. 1). More atomic clocks from the Hepingli site of NIM and Peking University (PKU) will join the synchronization network soon. As the first step to generate the coordinated frequency, using three-corner-hat method, we compared and get the frequency stability of each remote hydrogen maser located in THU, NIM-Changping and BIRM. The frequency dissemination stability of the synchronization network have been measured, which is better than  $1 \times 10^{-14}/s$  and  $5 \times 10^{-18}/day$ . Using the comparison results, we will calculate the weight of each clock, and generate the coordinated frequency via offsetting the phase of a synthesizer referenced by a master maser clock. The detailed results will be shown during the EFTF conference.

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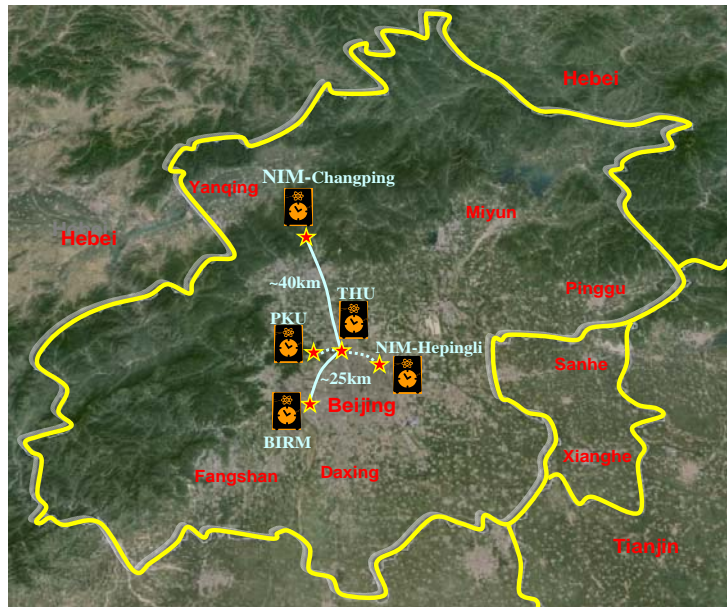


Figure1. Beijing regional time and frequency network. The solid line is the synchronization link under use. The dash line is the synchronization link under construction. The fiber link length between THU and NIM-Changping is 40 km, and the fiber link length between THU and BIRM is 25 km.