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Generation of continuous-wave 194 nm laser for mercury ion optical frequency standard[1] HONGXIN ZOU, YUE WU, GUOZHU CHEN, YONG SHEN, QU LIU, National University of Defense Technology, PRECISION MEASUREMENT AND ATOMIC CLOCK TEAM — 194 nm continuous-wave (CW) laser is an essential part in mercury ion optical frequency standard. The continuous-wave tunable radiation sources in the deep ultraviolet (DUV) region of the spectrum is also serviceable in high-resolution spectroscopy with many atomic and molecular lines. We introduce a scheme to generate continuous-wave 194 nm radiation with SFM in a Beta Barium Borate (BBO) crystal here. The two source beams are at 718 nm and 266 nm, respectively. Due to the property of BBO, critical phase matching (CPM) is implemented. One bow-tie cavity is used to resonantly enhance the 718 nm beam while the 266 nm makes a single pass, which makes the configuration easy to implement. Considering the walk-off effect in CPM, the cavity mode is designed to be elliptical so that the conversion efficiency can be promoted. Since the 266 nm radiation is generated by a 532 nm laser through SHG in a BBO crystal with a large walk-off angle, the output mode is quite non-Gaussian. To improve mode matching, we shaped the 266 nm beam into Gaussian modes with a cylindrical lens and iris diaphragm. As a result, 2.05 mW 194 nm radiation can be generated. As we know, this is the highest power for 194 nm CW laser using SFM in BBO with just single resonance.

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