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\$:Y\$\_{2}\$SiO\$\_{5}\$ crystal at cryogenic temperature Qun-Feng Chen, Andrei Troshyn, Ingo Ernsting, Steffen Kayser, Sergey Vasilyev,

Spectrally narrow, long-term stable optical

frequency reference based on a Eu\$^{3+}

Alexander Nevsky, Stephan Schiller

(Submitted on 19 Jul 2011 (v1), last revised 6 Sep 2011 (this version, v3))

Using an ultrastable continuous-wave laser at 580 nm we performed spectral hole burning of Eu\$^ {3+}\$:Y\$\_{2}\$SiO\$\_{5}\$ at very high spectral resolution. Essential parameters determining the usefulness as a "macroscopic" frequency reference: linewidth, temperature sensitivity, long-term stability were characterized, using a H-maser stabilized frequency comb. Spectral holes with linewidth as low as 6 kHz were observed and the upper limit of the drift of the hole frequency was determined to be on the order of 5\$\pm\$3 mHz/s. We discuss necessary requirements for achieving ultra-high-stability in laser frequency stabilization to these spectral holes.

Comments:4 pages, 4 figuresSubjects:Optics (physics.optics); Atomic Physics (physics.atom-ph)Cite as:arXiv:1107.3764 [physics.optics]<br/>(or arXiv:1107.3764v3 [physics.optics] for this version)

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