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Towards sub-femtosecond emission[1] SCOT MCGREGOR, University of Nebraska-Lincoln, ROGER BACH, RYAN HOTOVY, HERMAN BATELAAN — In earlier work we have shown that field emission tips can produce sub-100 femtosecond electron pulses upon illumination with a femtosecond laser pulse [1]. In later work we have shown that emission from a tungsten tip is limited to pulse durations longer than 5 femtoseconds [2]. For the purpose of reaching shorter duration pulses, we report the effect that different tip materials and operating conditions have on the pulse duration. Additionally, a method based on the phase relation between the first and second harmonic of the laser pulse is described that is thought to assist in the search for favorable operating conditions. This type of source is developed for a host of experiments including fundamental studies involving the Aharonov-Bohm effect [3], but also possible application such as enhancing pump-probe studies with temporal lenses [4]. [1] B. Barwick, C. Corder, J. Strohaber, N. Chandler-Smith, C. Uiterwaal and H. Batelaan, New J. Phys. 9, 142 (2007). [2] S. Hilbert, A. Neukirch, K, Uiterwaal, H. Batelaan, J. Phys. B, 141001, vol. 42 (2009). [3] H. Batelaan, A. Tonomura, Physics Today, (september issue of 2009). [4] S. Hilbert, B. Barwick, K. Uiterwaal, H. Batelaan, A. Zewail, Proc. Nat. Acad. Sci., p. 10558, vol. 106, (2009).

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