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### **► To cite this version:**

F. Clairet, C. Bottereau, A. Medvedeva, D. Molina, G. D. Conway, et al.. 1  $\mu$ s broadband frequency sweeping reflectometry for plasma density and fluctuation profile measurements. 14th International reflectometry workshop, May 2019, Lausanne, Switzerland. pp.1453 - 1454. cea-02289203

**HAL Id: cea-02289203**

**<https://cea.hal.science/cea-02289203v1>**

Submitted on 16 Sep 2019

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# 1 $\mu$ s broadband frequency sweeping reflectometry for plasma density and fluctuation profile measurements

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a) For a list of team members, see Appendix of H. Zohm et al., *Nucl. Fusion* 55 (10), 104010 (2015)

b) For a list of team members, see Appendix in *Fusion Science and Technology*, 56(3), pp. 1453–1454(2009)

c) For a list of team members, see "H. Meyer et al, Overview of progress in European Medium Sized Tokamaks towards an integrated plasma-edge/wall solution, accepted for publication in *Nuclear Fusion*"

Frequency swept reflectometry has reached the symbolic value of 1  $\mu$ s sweeping time [1], this performance has been made possible due to an improved control of the ramp voltage driving the frequency source. In parallel, the memory depth of the 1 Gs/s acquisition system has been upgraded and can provide up to 200 000 density profiles during a plasma discharge. Additionally, improvements regarding the trigger delay determination for the acquisition, which needs to be precisely set and the frequency sweep linearity required by this ultra-fast technique along with the stability of the ramp voltage driving the VCOs, have been made. While this diagnostic is traditionally dedicated to the density profile measurement, such a fast sweeping rate can provide the study of fast plasma events and turbulence with unprecedented time and radial resolution from the edge to the core and thus compete with the fixed frequency systems. Experimental results obtained on ASDEX Upgrade plasmas will be presented to demonstrate the performances of the diagnostic.

[1] F. Clairet *et al.* RSI 88, 113605 (2017)