



E I N L A D U N G

zum

V E R A - S E M I N A R

von

Davide Mazzotti

National Institute of Optics (INO) - CNR
and European Laboratory for Nonlinear Spectroscopy (LENS)
Florence, Italy

**SCAR spectroscopy
for radiocarbon measurements**

Radiocarbon optical detection, based on infrared laser spectroscopy, was originally proposed long time ago [1]. About 30 years later, our research group developed a novel high-sensitivity spectroscopic technique, named saturated-absorption cavity ring-down (SCAR) [2], benefiting from advantages of both conventional cavity ring-down and saturation spectroscopy. After a preliminary comprehensive investigation of the infrared spectrum of $^{14}\text{C}^{16}\text{O}_2$ at $4.5\ \mu\text{m}$ with a highly enriched sample [3], we demonstrated the first radiocarbon detection at natural abundance with all optical technique [4]. Linearity and accuracy of SCAR-based radiocarbon dioxide concentration measurements were also characterized comparing results with AMS [5].

After refining the data fitting model [6] and upgrading the experimental apparatus in terms of simplicity, transportability, immunity to interferences and data acquisition rate, we have recently achieved measurement precision and repeatability which promise to challenge the AMS performance in the near future [7].

References

[1] Labrie et al., *J. Appl. Phys. A* **24**, 381 (1981).

[2] Giusfredi et al., *Phys. Rev. Lett.* **104**, 110801 (2010).

[3] Galli et al., *Mol. Phys.* **109**, 2267 (2011).

[4] Galli et al., *Phys. Rev. Lett.* **107**, 270802 (2011).

[5] Galli et al., *Radiocarbon* **55**, 213 (2013).

[6] Giusfredi et al., *J. Opt. Soc. Am. B* **32**, 2223 (2015).

[7] Galli et al., *Optica* **3**, 385 (2016).

Donnerstag, 22.06.2017, 16:30 Uhr

**1090 Wien, Währinger Str. 17, "Kavalierstrakt",
1. Stock, Victor-Franz-Hess Hörsaal**