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An optogalvanic flux sensor for trace gases JOHANNES SCHMIDT, Center for Integrated Quantum Science and Technology (IQST), University of Stuttgart, MARKUS FIEDLER, DENIS DJEKIC, PATRICK SCHALBERGER, HOLGER BAUR, ROBERT LOEW, TILMAN PFAU, JENS ANDERS, NORBERT FRUEHAUF, IQST, University of Stuttgart, EDWARD GRANT, Department of Chemistry and Department of Physics & Astronomy, The University of British Columbia, HARALD KUEBLER, IQST, University of Stuttgart — We demonstrate the applicability of a new kind of gas sensor based on Rydberg excitations. From an arbitrary probe gas the molecule in question is excited to a Rydberg state, by succeeding collisions with all other gas components this molecule gets ionized and the emerging electron and ion can then be measured as a current, which is the clear signature of the presence of this particular molecule. As a first test we excite Alkali Rydberg atoms in an electrically contacted vapor cell [1,2] and demonstrate sensitivities down to 100 ppb on a background of N_2. We investigate different amplification circuits, ranging from solid state devices on the cell to thin film technology based transimpedance amplifiers inside the cell [3]. For a real life application, we employ our gas sensing scheme to the detection of nitric oxide in a background gas at thermal temperatures and atmospheric pressure.

[1] D. Barredo, et al., *Phys. Rev. Lett.* **110**, 123002 (2013)
[2] R. Daschner, et al., *Opt. Lett.* **37**, 2271 (2012)
[3] J. Schmidt, et al., *AMFPD* **24**, 296-298 (2017)

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