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A monolithic cavity-enhanced absorption spectrometer for NO2 detection in the ppb concentration levels. A. LOZANO FONTALVO, A. M. JUÁREZ, Instituto de Ciencias Físicas, Universidad Nacional Autónoma de México., THOMAS SIEGEL, ASE Optics Europe. — In the past decade, many diagnostic techniques have been developed to detect and quantify the concentration of pollutants such a NOx. Among them, Incoherent broad-band cavity-enhanced absorption spectroscopy (IBBCEAS) which employs a LED as a radiation source and an optical cavity to enhance the absorption of the LED light is one of the simplest. The relatively wide spectrum of wavelengths provided by LEDs allows this technique to simultaneously detect many pollutants such as NO_2 and NO_3 with enhanced sensitivity. In this work we report the development of a spectrometer which implements an IBBCEAS set-up which uses a LED centered at 634 nm, for the detection of NO_2. The optimal averaging acquisition time for this instrument, as evaluated using Allan variance, is found to be of 500s. For this acquisition time, the smallest detectable absorption is $1.01\text{x}10^{-9}$ cm^{-1}, which corresponds to a detection limit of 3.36ppb. The monolithic design presented in this work, does not require the alignment of mirrors, making it very practical and easy to handle. This compact and inexpensive instrument is a promising tool for monitoring air quality among many other applications including the generation of traces in plasmas and molecular biological processes.

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