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Submillimetre spectroscopy of the volatile metabolome

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Gaseous ensembles of molecules, called the volatilome, are fingerprints [1]–[3] of the metabolism of living organisms, including bacteria and archeobacteria. The submillimetre spectroscopy of these mixtures [4] could provide an interesting analysis alternative to gas chromatography coupled to mass spectroscopy (GC-MS) as there would be less effects (heating, ionization) damaging the integrity of large molecules. The characterization of ensembles would then in medical situations [5], [6] discriminate pathological situations or possibly identify bacteria resistant to antibiotics, and in food industry [7], [8] survey fermentation processes. The realization of an instrument meets several challenges. (a) The optical generation of submillimetre waves promises to attain a large frequency span, thus a large molecule span: we will present results towards such a compact and tuneable source. (b) The detection system should present a large signal to noise ratio, in order to detect molecules at trace levels. (c) The sampling system should take care that a large fraction of volatile biological molecules are actually liquid at ambient temperature and pressure.

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