

REAL TIME PARALLEL CHANNEL SPECTROMETER FOR 3D CLOUD PROFILING
Project Summary

The goal of this Phase I STTR contract was to develop the conceptual design for an advanced system for use as a validation or referee system for the testing of advanced point and stand-off chemical detection devices. The proposed system combines an innovative Imaging Open Path Fourier Transform Infrared (I-OPFTIR) spectrometer with advanced computed tomography algorithms. The proposed technology expands the capability of OP-FTIR systems to 3D profiling applications. The system employs a single modulator and a novel optical configuration which projects an array of angularly dispersed IR beams, each of which exhibits comparable throughput to a single channel OP-FTIR, to an array of respective retroreflector arrays remotely located at the opposite side of the test grid. The return light from each retroreflector array is imaged onto respective detectors that record the spatially-resolved interferograms which are subsequently transformed and analyzed for molecular content via advanced multicomponent algorithms. In this way the performance of the OP-FTIR system is maintained without adding the bulk and expense of multiple systems. Moreover, the active measurement (i.e. including an IR source) allows for detection when there would otherwise be zero temperature contrast between the plume and background (a likely scenario for the indoor application). System cost and weight are further reduced by the use OPTRA's lightweight, low-cost retroreflector array.

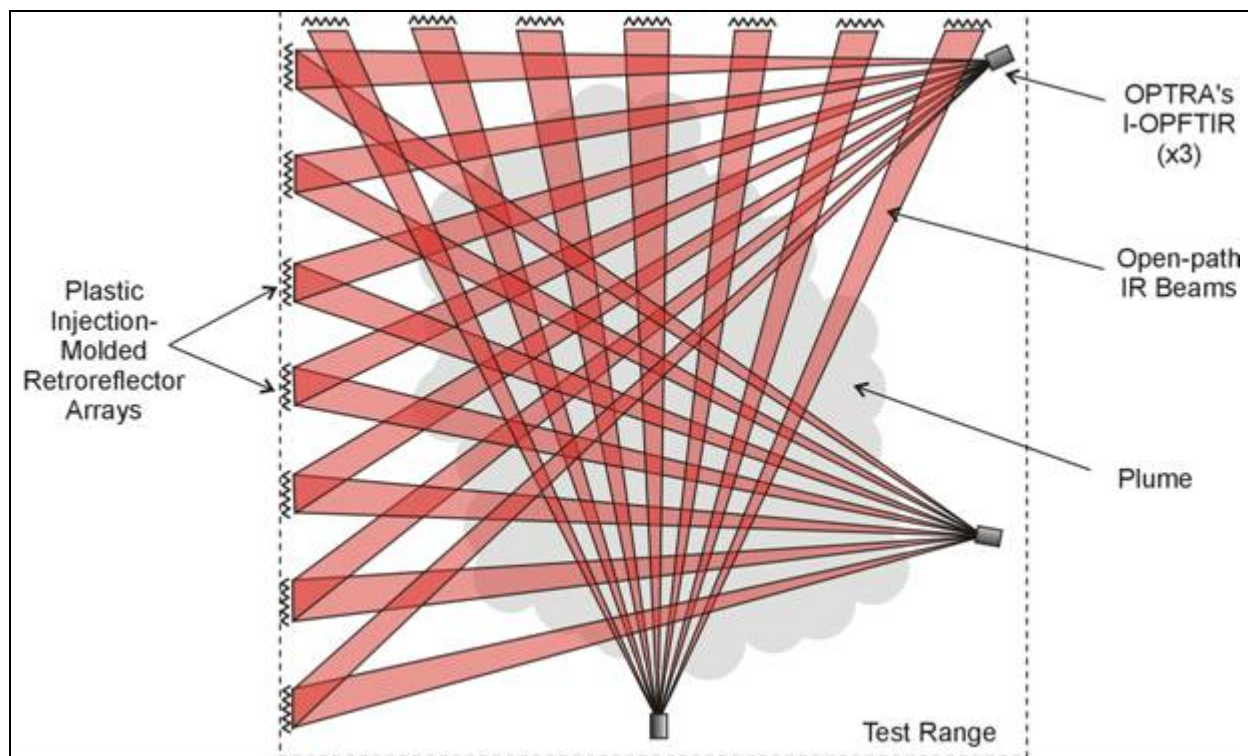


Figure 1. Schematic representation of 3D Cloud Profiling.