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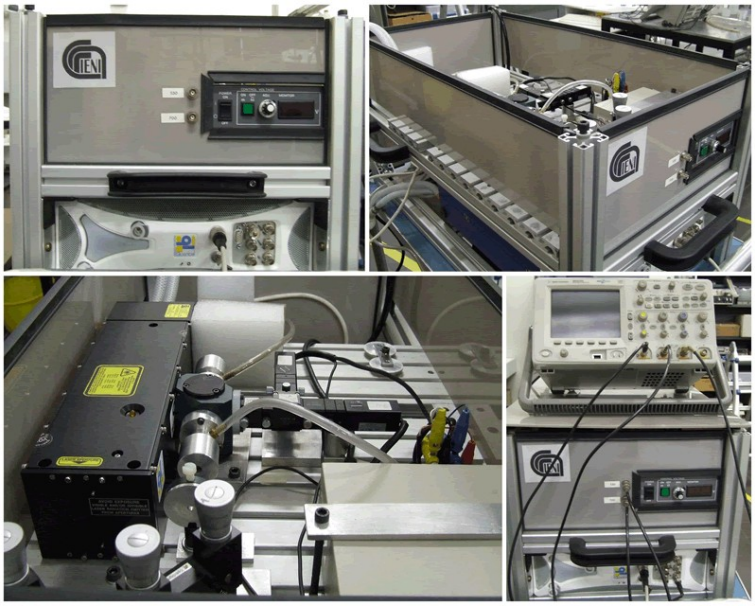
SILIIS: Sphere-integrated Laser-Induced Incandescence Spectroscopy
A novel instrument for carbonaceous particles detection

A portable instrument for the detection of carbonaceous particles has been designed and developed In the laboratory of Laser Diagnostics in Milano. The instrument is essentially based on the application of the two-color laser-induced incandescence (LII) technique, which is one of the main expertise of the laboratory. The group is active participant of an international community which periodically meets to foster discussion on the understanding of the LII diagnostic and to promote joint research partnerships (http://liiscience.org/).

A pulsed laser beam is used to properly heat the particles up to the sublimation temperature (about 4000K). The resulting incandescence radiation emitted from the particles after each laser pulse allows us to derive the volume fraction and the particle size. The instrument has been calibrated with other optical techniques.

Measurements of particulate with the LII instrument have been conducted in different environmental conditions, covering a wide range of concentration (from ambient air to cars exhaust). The detection limit of the LII instrument has been estimated to be in the range of 200 ng/m^3. These measurements have been also compared with results obtained with a commercial one-wavelength aethalometer. The results show a good agreement between the two sets of measurements, also in the case where significant variation of the carbon particles concentration has been observed in the different environments.



Reference: F. Migliorini, S. De Iuliis, S. Maffi, G. Zizak
Environmental application of pulsed Laser-Induced Incandescence
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