Development and application of laser induced incandescence (LII) as a diagnostic for soot particulate measurements

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ABSTRACT
LII is a promising diagnostic for *in-situ* measurements of particulates. The LII signal is shown to be proportional to soot volume fraction. Due to the large dynamic range of the LII technique, we have been able to measure time-averaged soot concentrations in the part per billion range with a spatial resolution of ~0.5 mm in each dimension. The decay of the LII signal in the post evaporative region is shown to be a sensitive measure of primary particle size. A numerical model has been developed which accurately predicts post evaporative LII signal decay rates. The prediction of the excitation curve is unsatisfactory, with more work needed to correctly model the particle behaviour during the soot evaporation phase.

Also, the model predicts that the prompt LII signal will vary as the 3.33 power of particle diameter. However, this predicted departure from strict proportionality between LII signal and soot volume fraction was not experimentally observed.