# Ultra-high-speed fuel tracer PLIF in a heavy-duty PPC engine

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## Work-In-Progress Abstract

Ultra-high-speed fuel-tracer planar laser induced fluorescence (PLIF) imaging has been performed in an optical heavy-duty engine. LIF is a common diagnostic technique used to probe fuel distribution and thus study in-cylinder fuel injection processes and mixture formation inside the combustion chamber. In the current work, a state-of-the-art burst laser system, operating at 36 kHz repetition rate, was employed to excite acetone, used as a fuel tracer. At least 90 consecutive PLIF images were obtained within a single engine cycle. As a result, fuel distribution was visualized inside the combustion chamber with high temporal resolution, i.e. 0.2 crank angle degrees. This study enables us to investigate fuel injection, mixture formation and onset of combustion in individual engine cycles. In contrast to 10 Hz laser systems, the high repetition rate of the burst system allows us to follow cycle-to-cycle variations.

Figure 1 shows a representative image of fuel distribution at 3.1 CAD before top dead center. The six spray plumes and the interaction between them are presented in several CADs. The effect of turbulence on the spray mixing and eddies, which are formed, dictate the fuel distribution. The blue circle represents the edge of the piston bowl, whereas the dot in the middle shows the position of the injection tip.

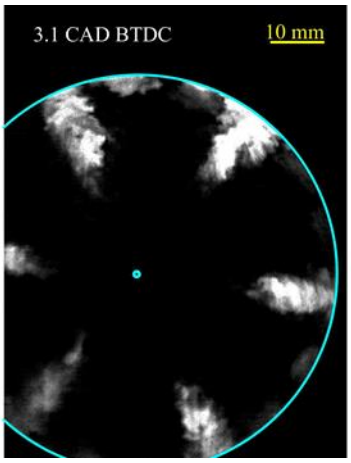


Figure 1. A PLIF image after post-processing at 3.1 CAD BTDC.