



STAND FOR IMAGING RECORDING OF THE FORMATION OF EXPLOSIVE ATMOSPHERES AND OF THE INITIATION AND DEVELOPMENT OF RAPID COMBUSTION PROCESSES

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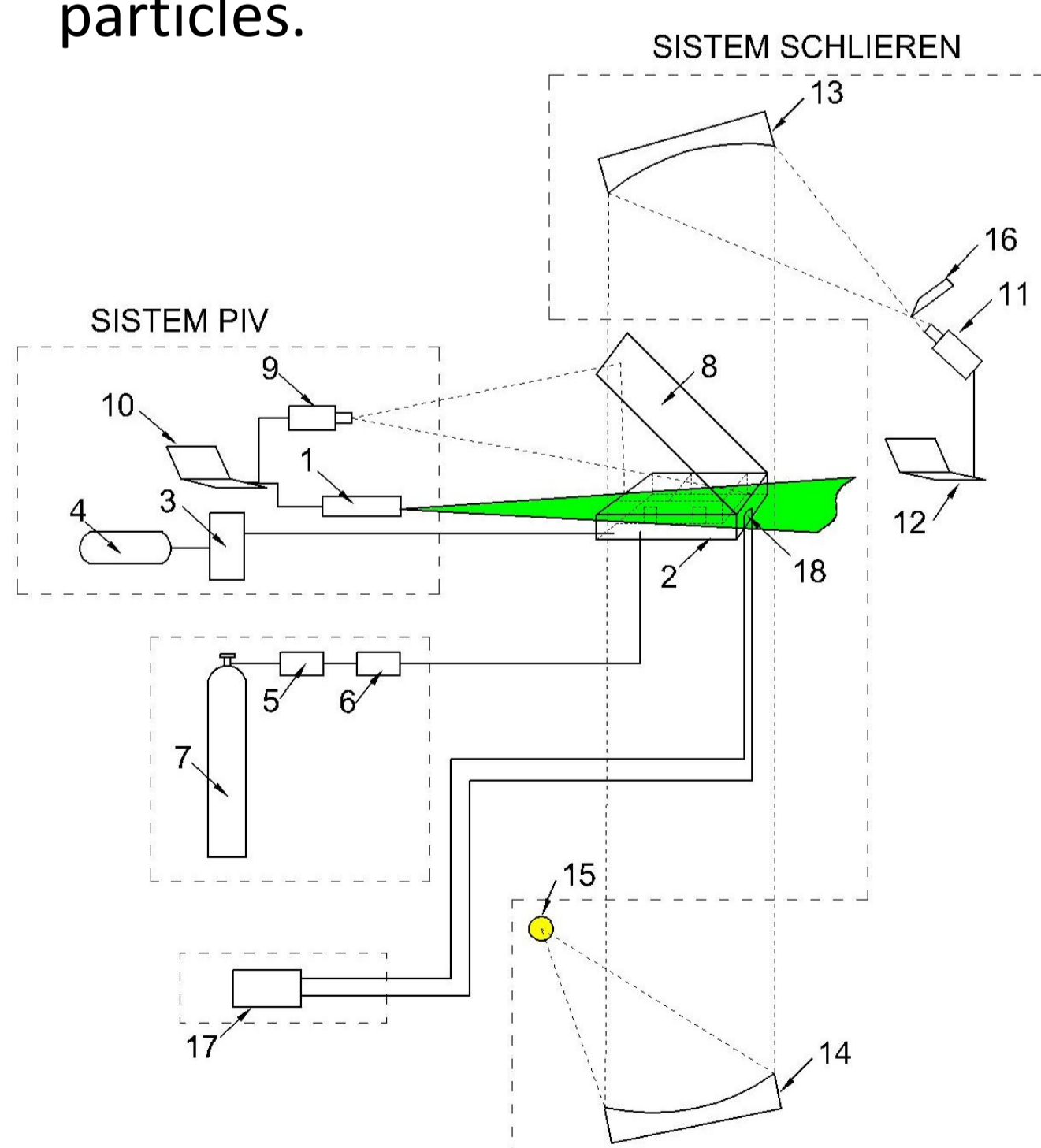
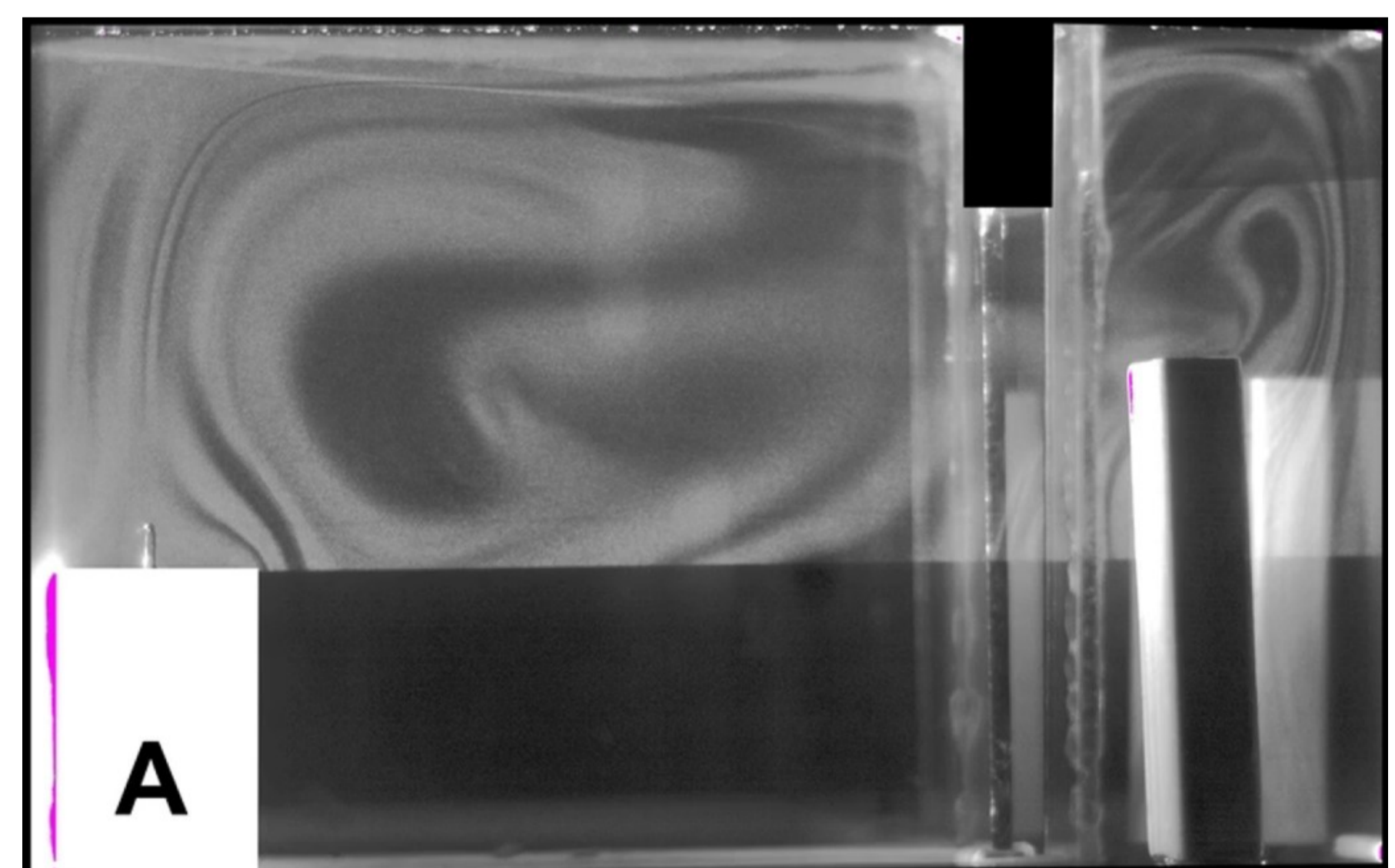
Summary of the invention

The stand simultaneously uses two modes of visualizing fluid movements in the transparent medium under analysis:

- the first mode is intended for recording, by highlighting some particles in suspension with the help of a laser source, of the regime of low speeds under which the diffusion of combustible gases takes place, and the formation of explosive atmospheres mixed with air;
- the second mode offers the recording capabilities at higher speeds, of the moment of initiation and, subsequently, of the density gradients generated by the flame front at the boundary between the burned and unburned gases during the explosion process.

The stand for imaging recording of the formation of explosive atmospheres and of the initiation and development of rapid combustion processes includes a construction with transparent walls and interconnected spaces (the environment under analysis), inside which the combustible gas is introduced and the explosive mixture is created in combination with air.

The first recording system – arranged horizontally – based on the PIV (Particle Image Velocimetry) technique, consists of a pulsed laser source correlated in frequency with a CMOS video camera, a particle generator and a computer. This system highlights the formation of the explosive atmosphere, through the movement of suspended particles.



The second recording system – arranged vertically – uses Schlieren techniques and consists of a point light source, two parabolic mirrors, a shutter, a high-speed video camera and a computer. The role of this system is to highlight the initiation of the explosive atmosphere inside the transparent construction and the development and behavior of the flame front during the explosion process.



Through the computerized combination of the recordings made by the two techniques, the continuity of the combustion analysis is ensured, from the laminar to the turbulent regime.

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