

High-speed particle detection and tracking in microfluidic devices using event-based sensing

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SUPPLEMENTARY INFORMATION

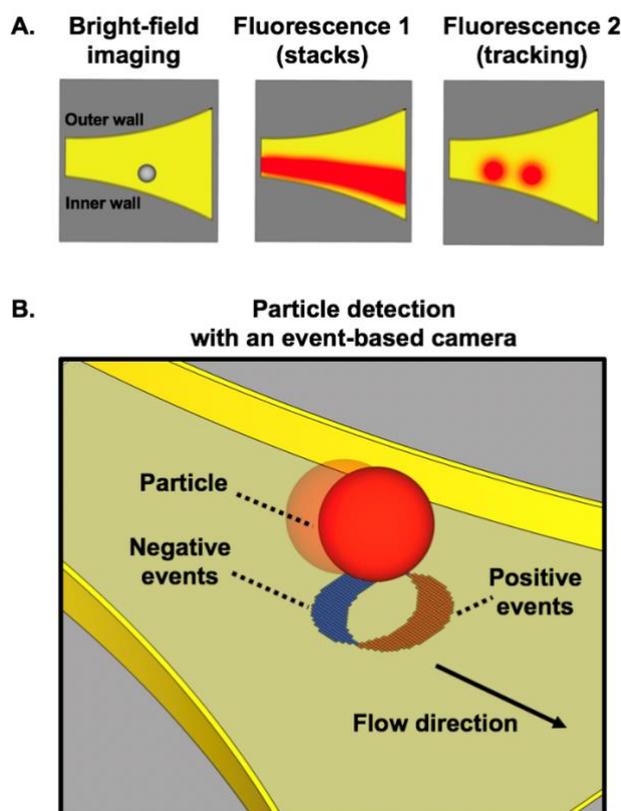


Figure S1. **A.** Standard approaches for imaging particles in inertial focusing devices include bright-field (or phase contrast) images of moving particles, composite images from long-exposure fluorescent signals or single fluorescent particle visualisation (e.g., using particle image velocimetry). **B.** An event-based camera is used here for particle detection and tracking. When a particle moves, the induced changes in brightness are recorded by the camera. Negative (blue) events are schematically displayed to highlight pixels from the event-based camera that would detect a decrease in brightness and positive (red-brown) ones to highlight an increase.

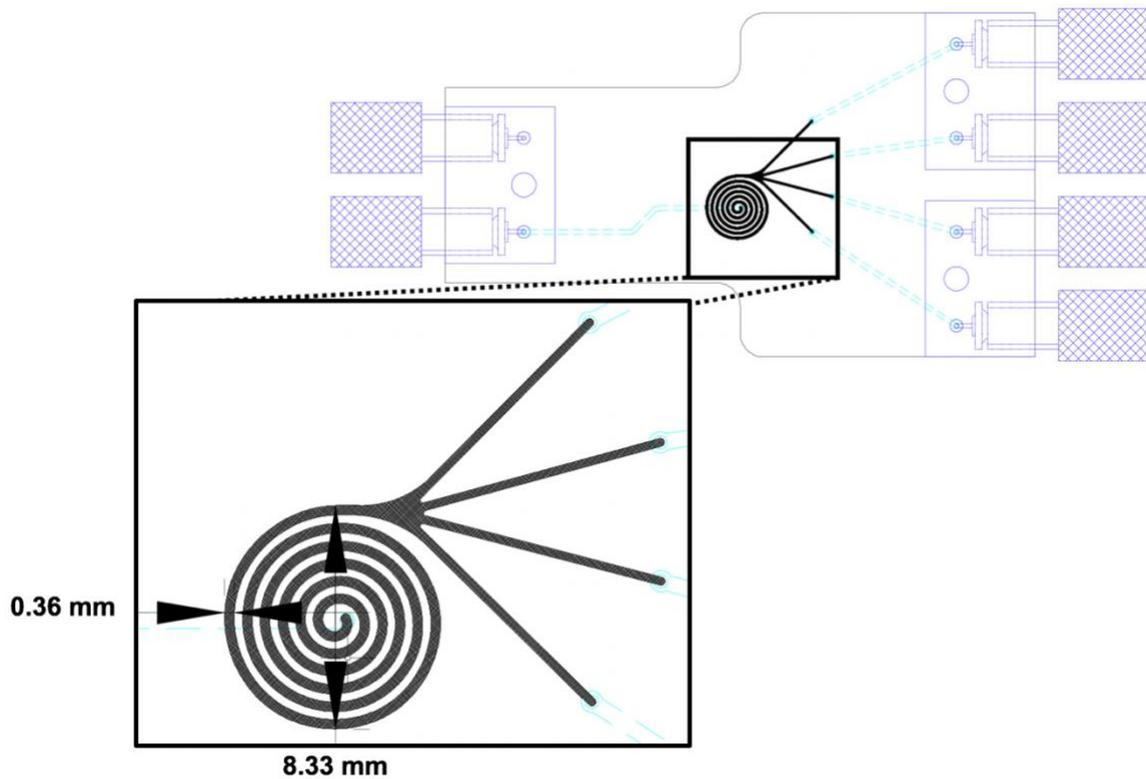


Figure S2. CAD design of the spiral channel used for particle detection using the event-based camera. The spiral has one inlet and four outlets. The spiral consists of six loops with a constant rectangular cross-section (360 μm in width, 60 μm in height). The radius of curvature varies from 0.9 mm to 4.2 mm.

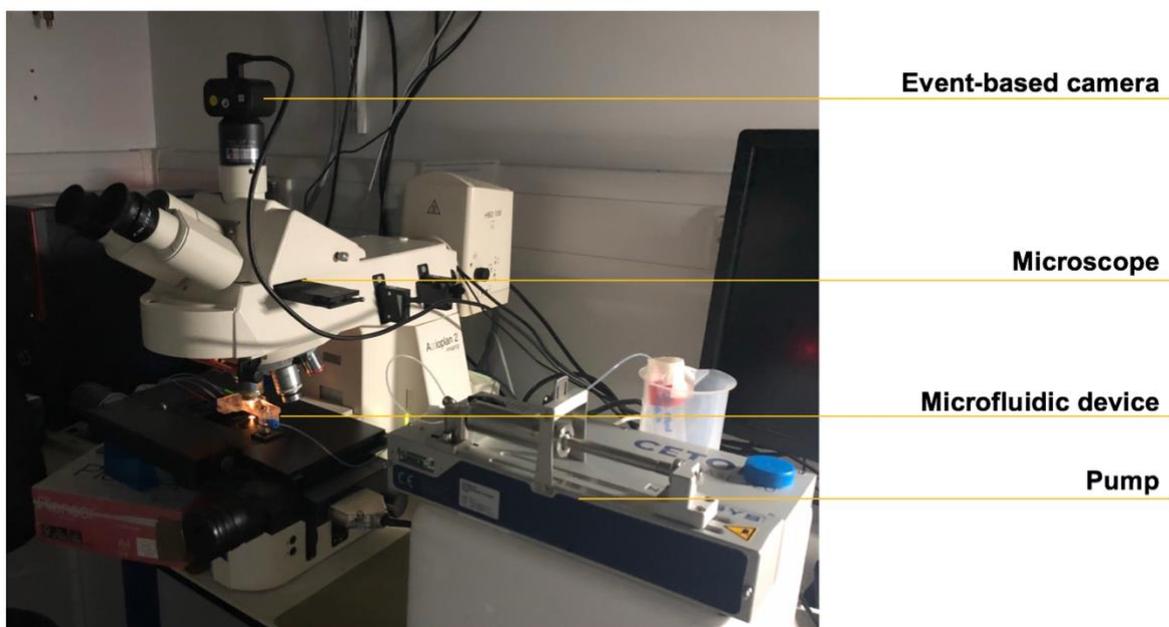


Figure S3. Picture of the experimental setup.

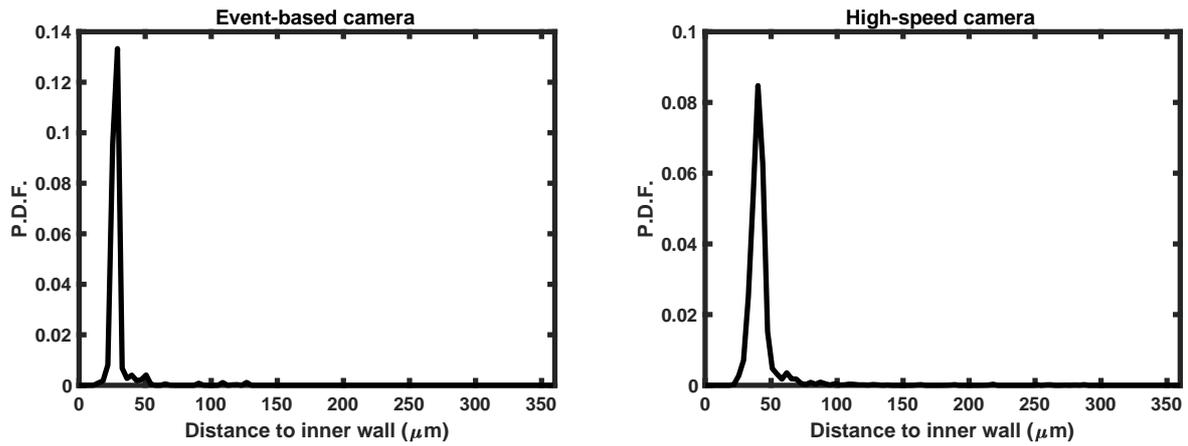


Figure S4. Probability density function (P.D.F.) of particle focusing position in the spiral channel for an average fluid velocity of 1.54 m.s^{-1} using event-based sensing (left) and high-speed imaging (right). Both plots are based on more than 2000 particles ($10 \text{ }\mu\text{m}$ in diameter) detected using either fluorescence (event-based sensing) or bright-field imaging (high-speed camera). The experimental set-up for high-speed imaging is described in Reference (36).