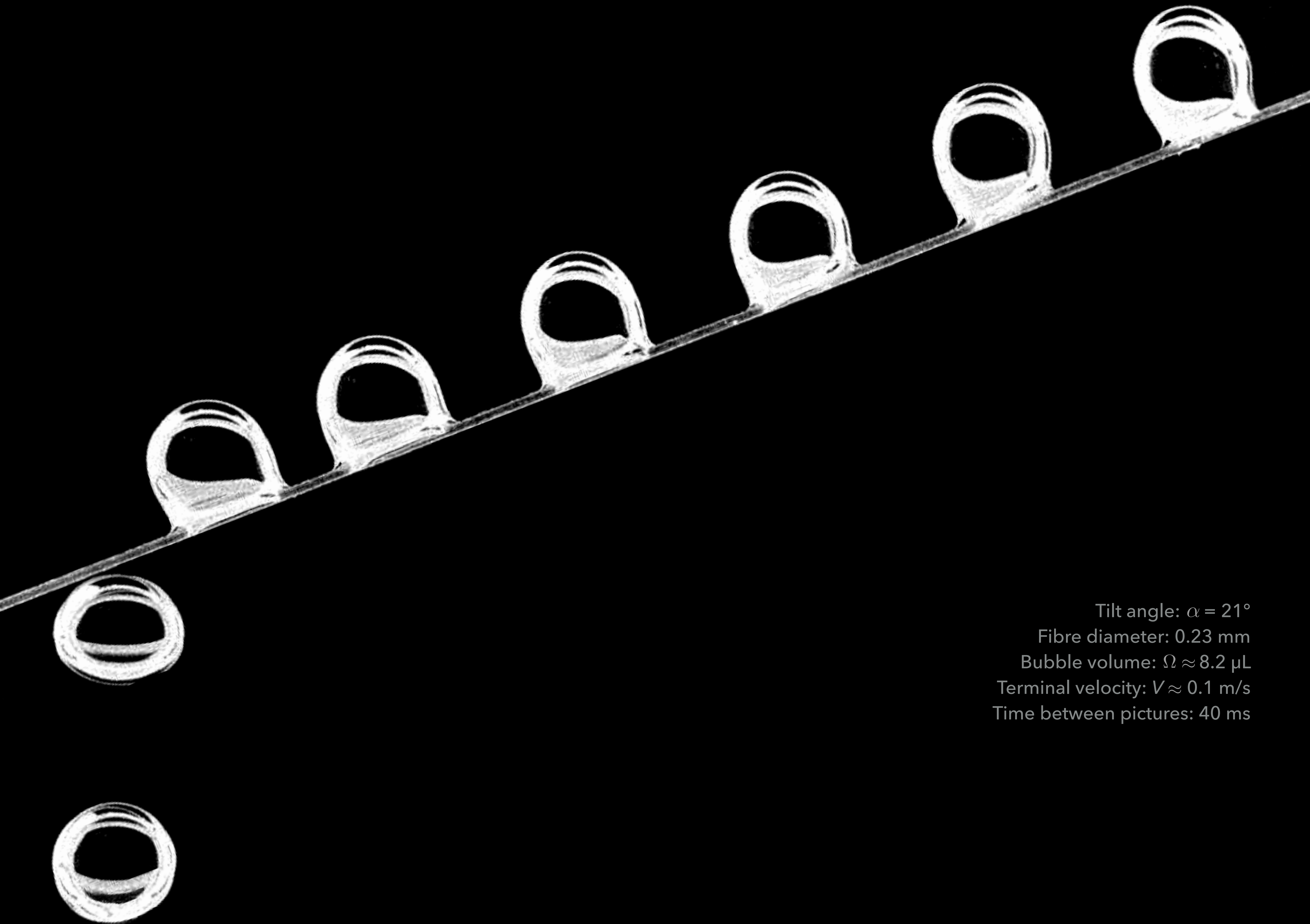


HÉLÈNE DE MALEPRADE - MATTHIAS PAUTARD - CHRISTOPHE CLANET - DAVID QUÉRÉ  
PMMH (ESPCI) - LADHYX (ÉCOLE POLYTECHNIQUE) - PARIS, FRANCE



Tilt angle:  $\alpha = 21^\circ$   
Fibre diameter: 0.23 mm  
Bubble volume:  $\Omega \approx 8.2 \mu\text{L}$   
Terminal velocity:  $V \approx 0.1 \text{ m/s}$   
Time between pictures: 40 ms

# TIGHTROPE WALKAIR

AN AEROPHILIC FIBRE IMMERSSED IN WATER CAN CAPTURE A RISING AIR BUBBLE AND GUIDE IT TO THE SURFACE. WE EXPERIMENTALLY OBSERVE A TERMINAL VELOCITY, RESULTING FROM THE BALANCE OF BUOYANCY  $\rho\Omega g\alpha$  (WHERE  $\rho$  IS THE DENSITY OF WATER AND  $g$  THE ACCELERATION OF GRAVITY) WITH A SKIN FRICTION  $\sqrt{\rho\eta}(RV)^{3/2}$  (WITH  $\eta$  THE VISCOSITY OF WATER). HENCE WE OBTAIN:

$$V \approx R \left( \frac{\eta}{\rho} \right)^{-1/3} (g\alpha)^{2/3}$$