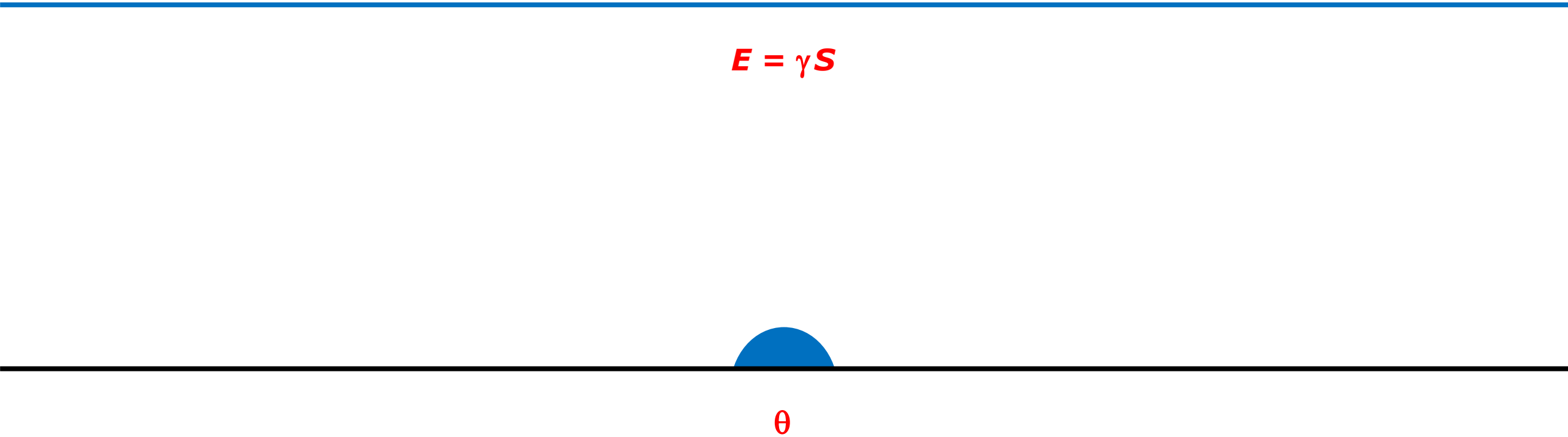
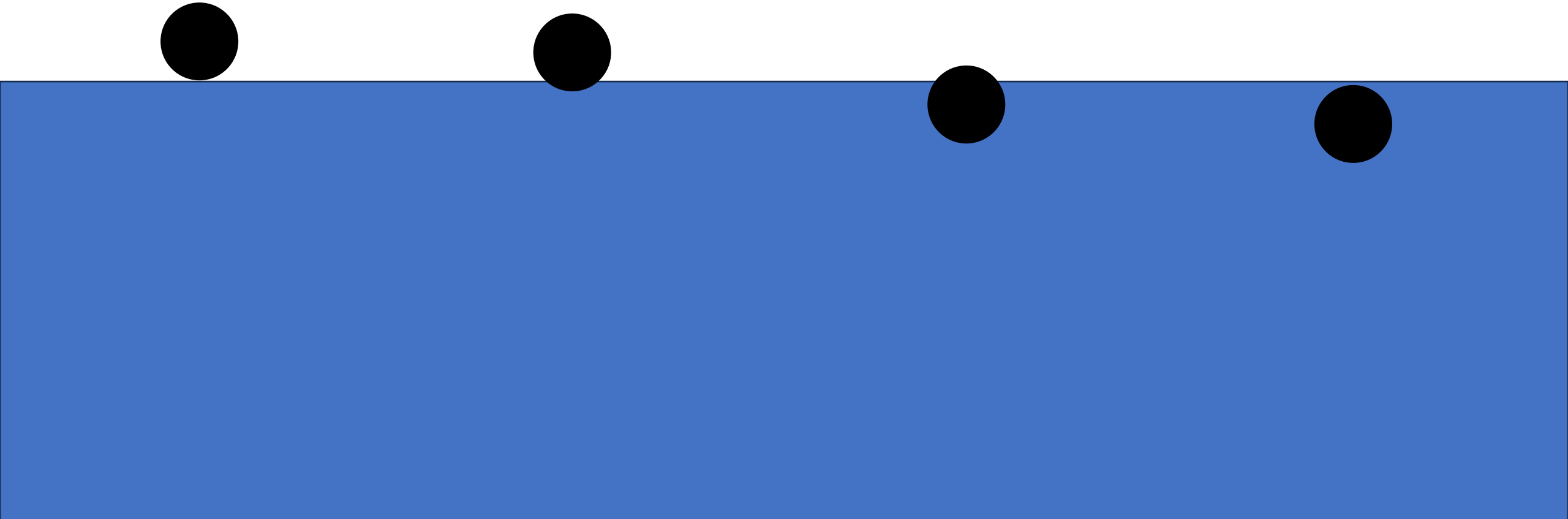
GRAINS AT INTERFACES

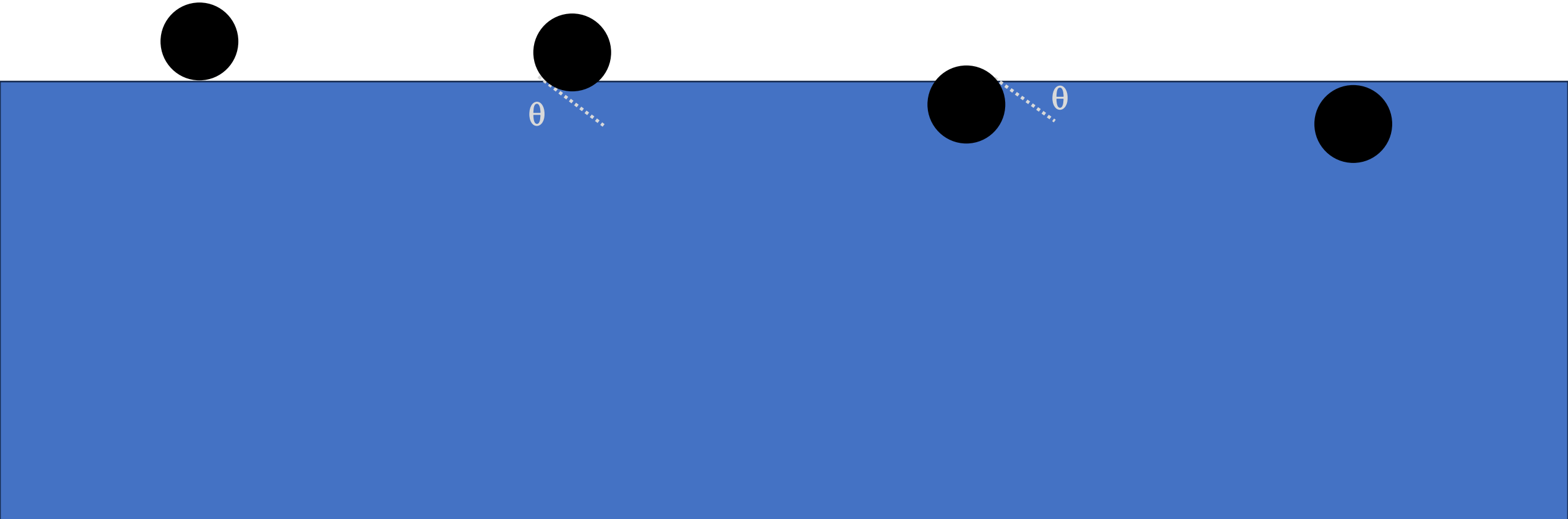
PRINCIIPLES AND APPLICATION TO LIQUID MARBLES

PASCALE AUSSILLOUS, YUI TAKAI,
AURIANE HUYGHUES DESPOINTES

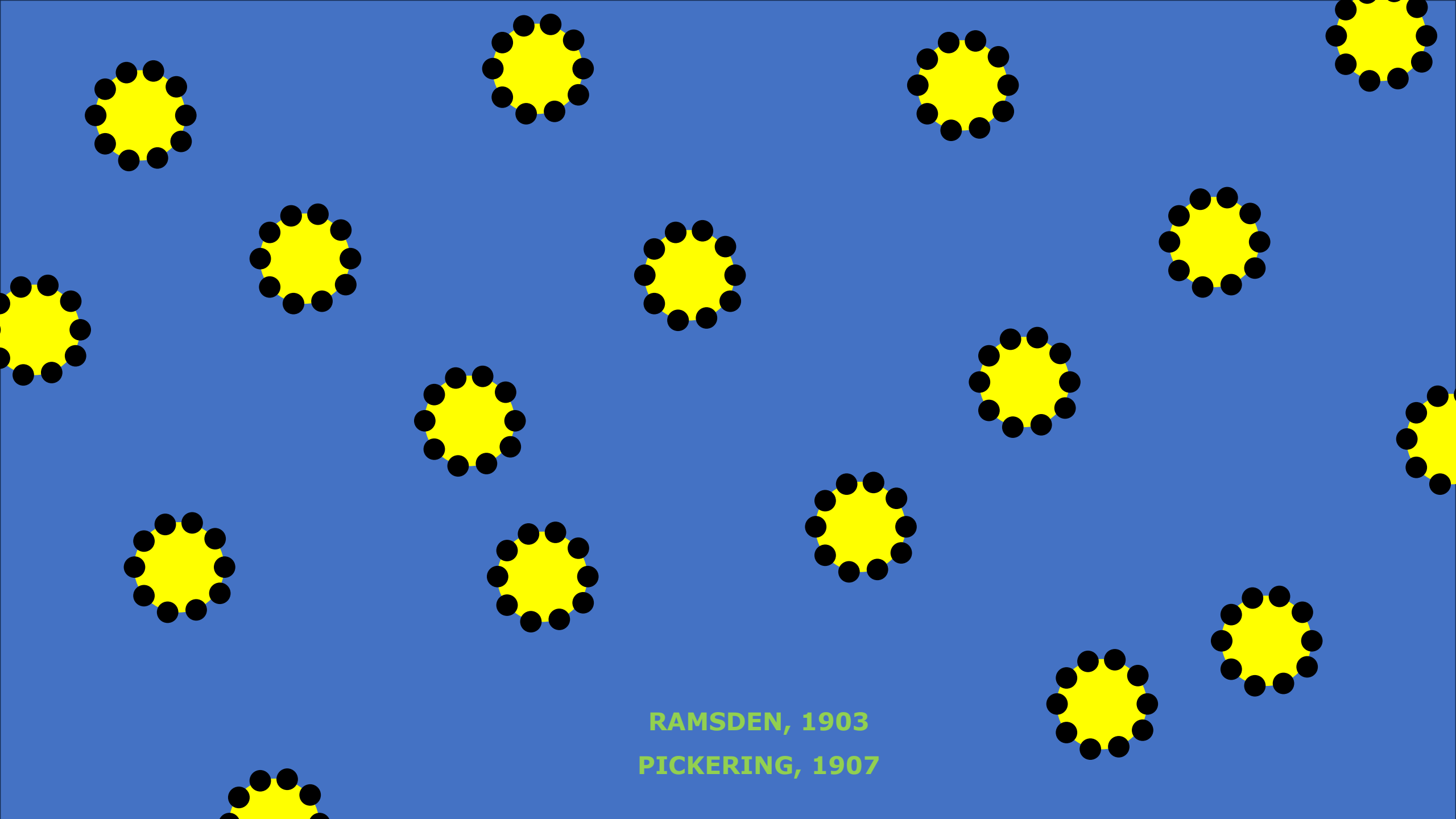
$$E = \gamma S$$

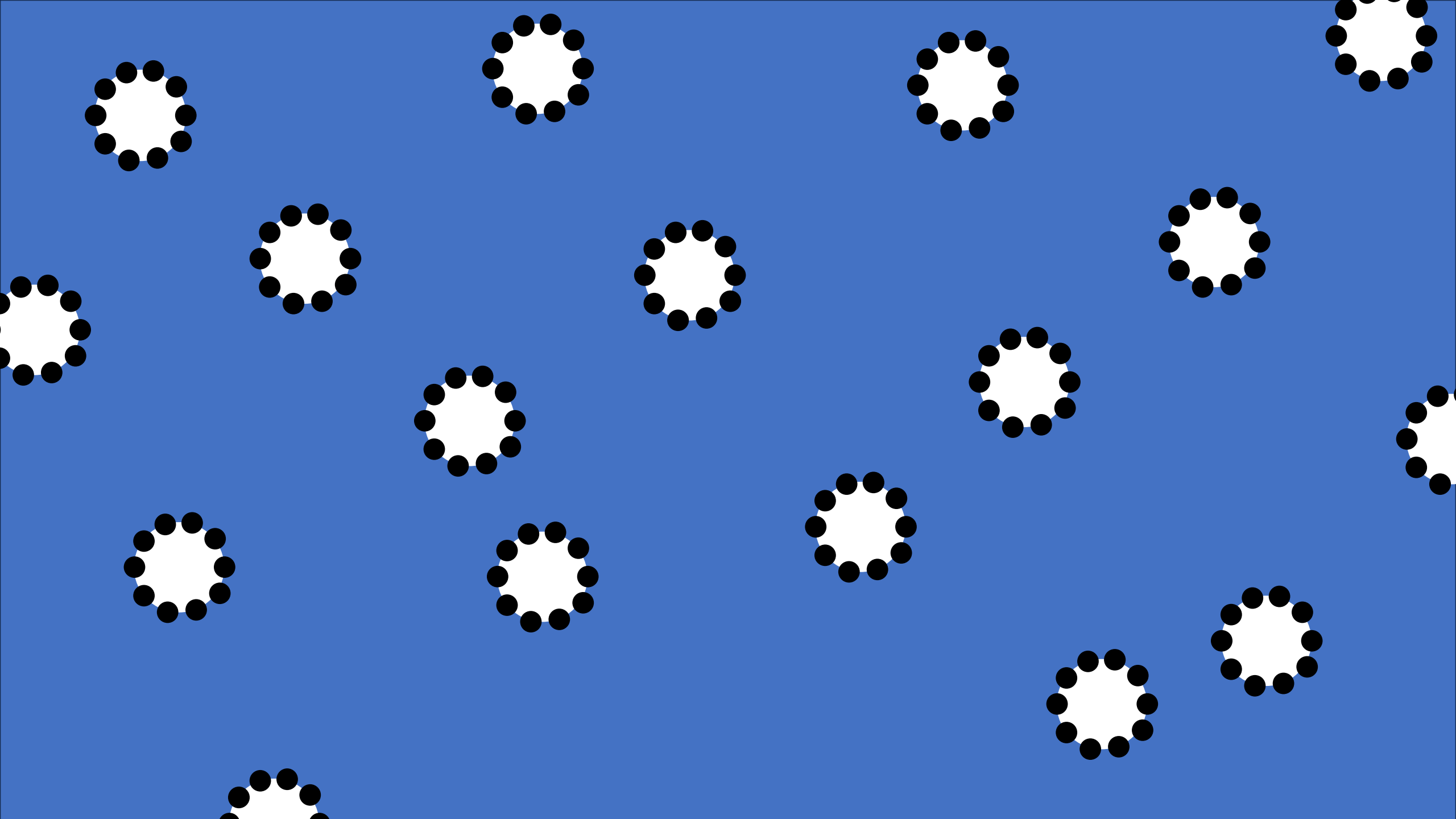


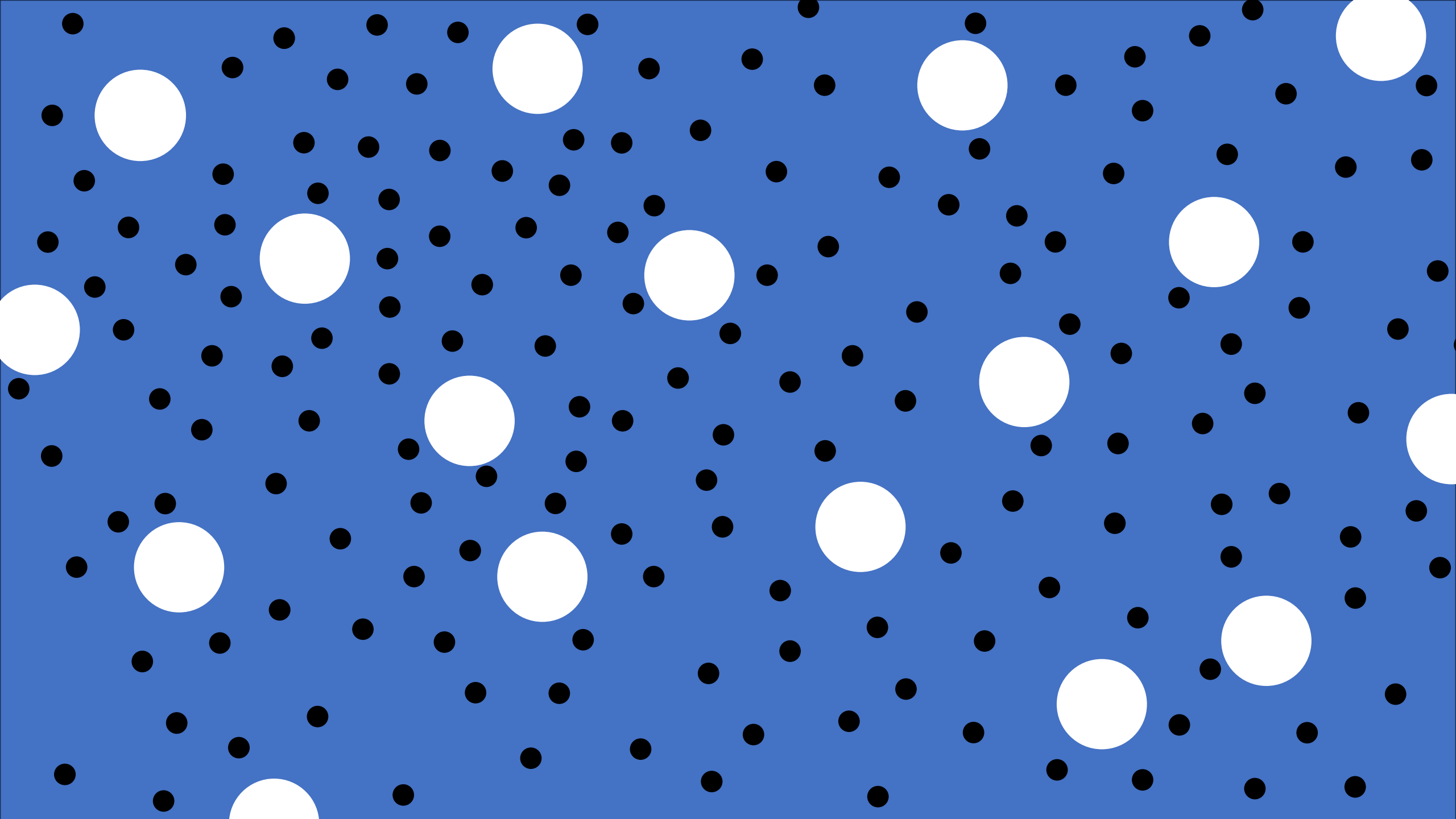



θ
θ

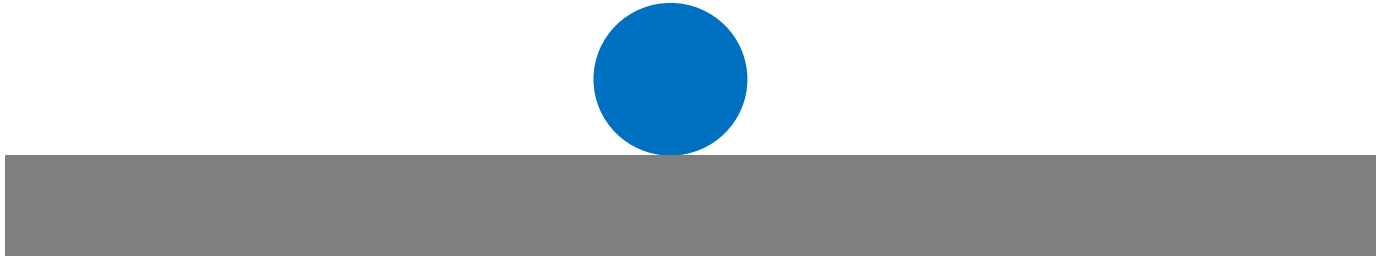
BARTHLOTT, 1996


RAMSDEN, 1903
PICKERING, 1907





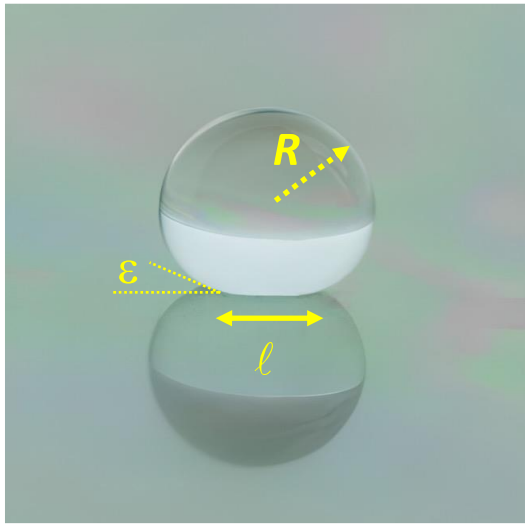
PASCALE AUSSILLOUS, 2006



$$R < a$$

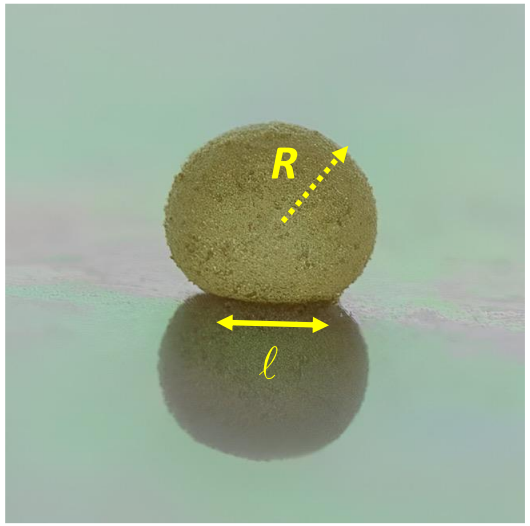
$$a = (\gamma/\rho g)^{1/2}$$

$$\ell = 0$$



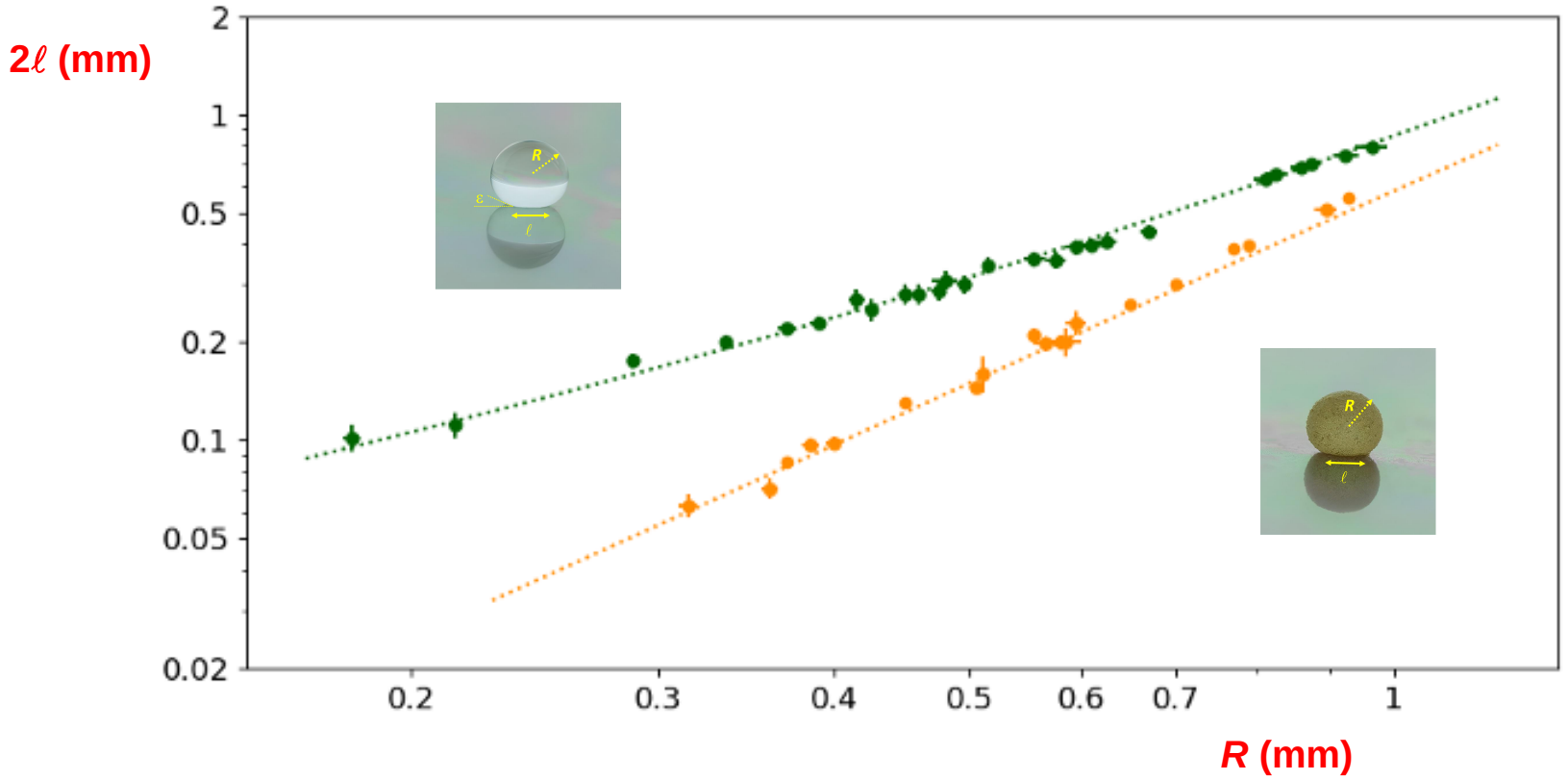
$\ell \sim R\varepsilon$

$g \sim 0$



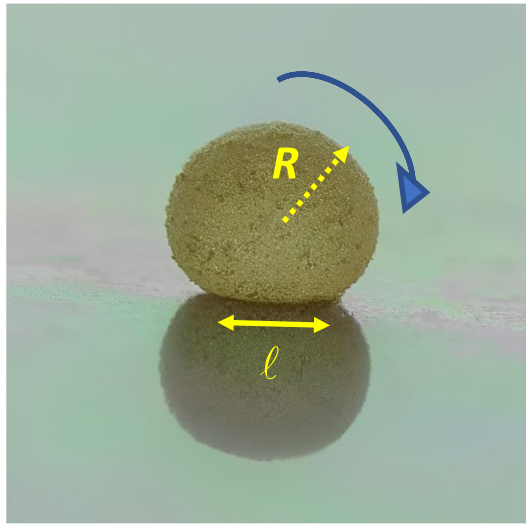
$\ell \sim R^2/a$

$\varepsilon \sim 0$



AURIANE HUYGHUES DESPOINTES, 2024

PASCALE AUSSILLOUS, 2006



$$\ell \sim R^2/a$$

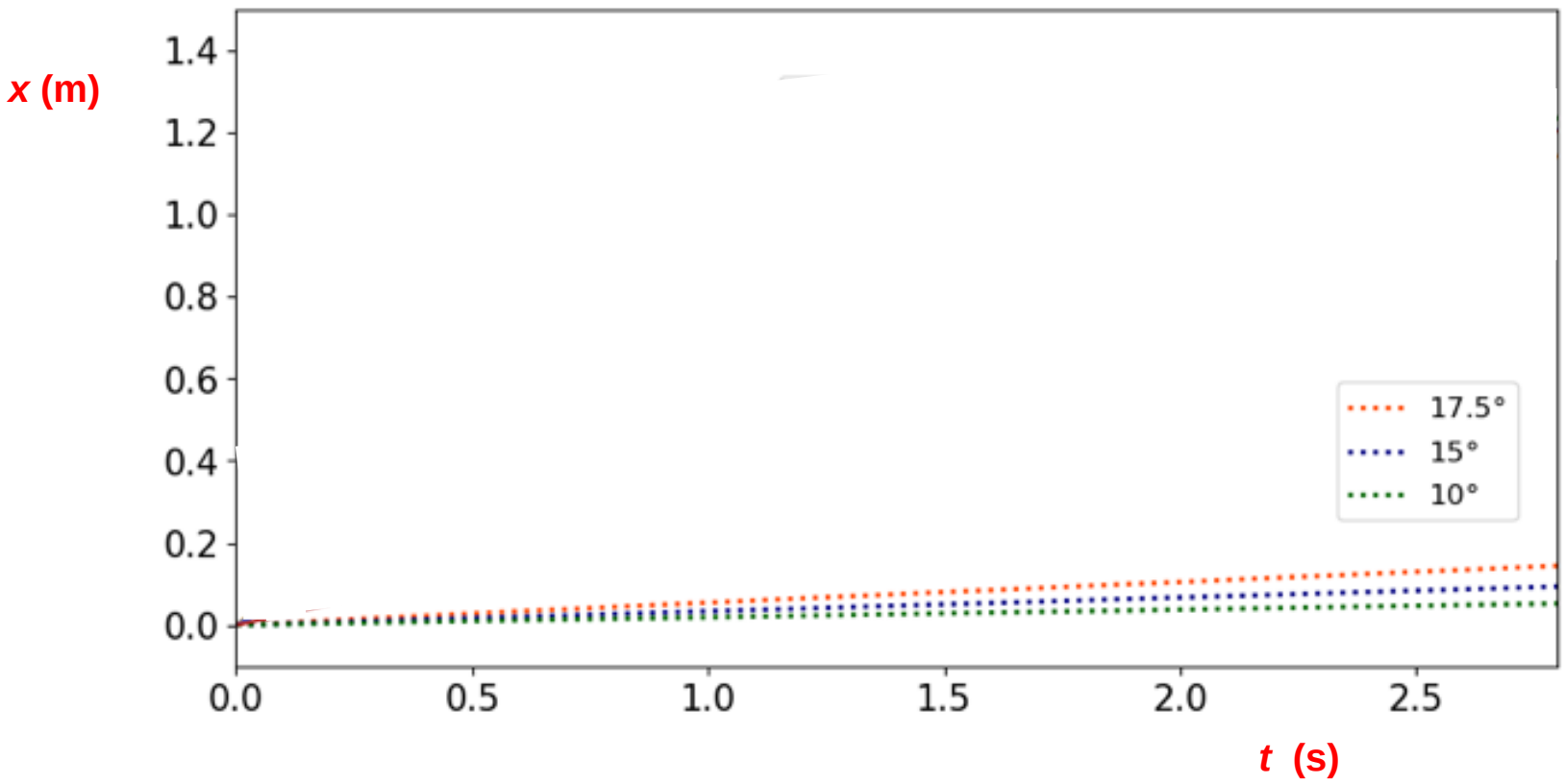
$$V \sim (\gamma\alpha/\eta)\, a/R$$

MAHADEVAN & POMEAU, 1999

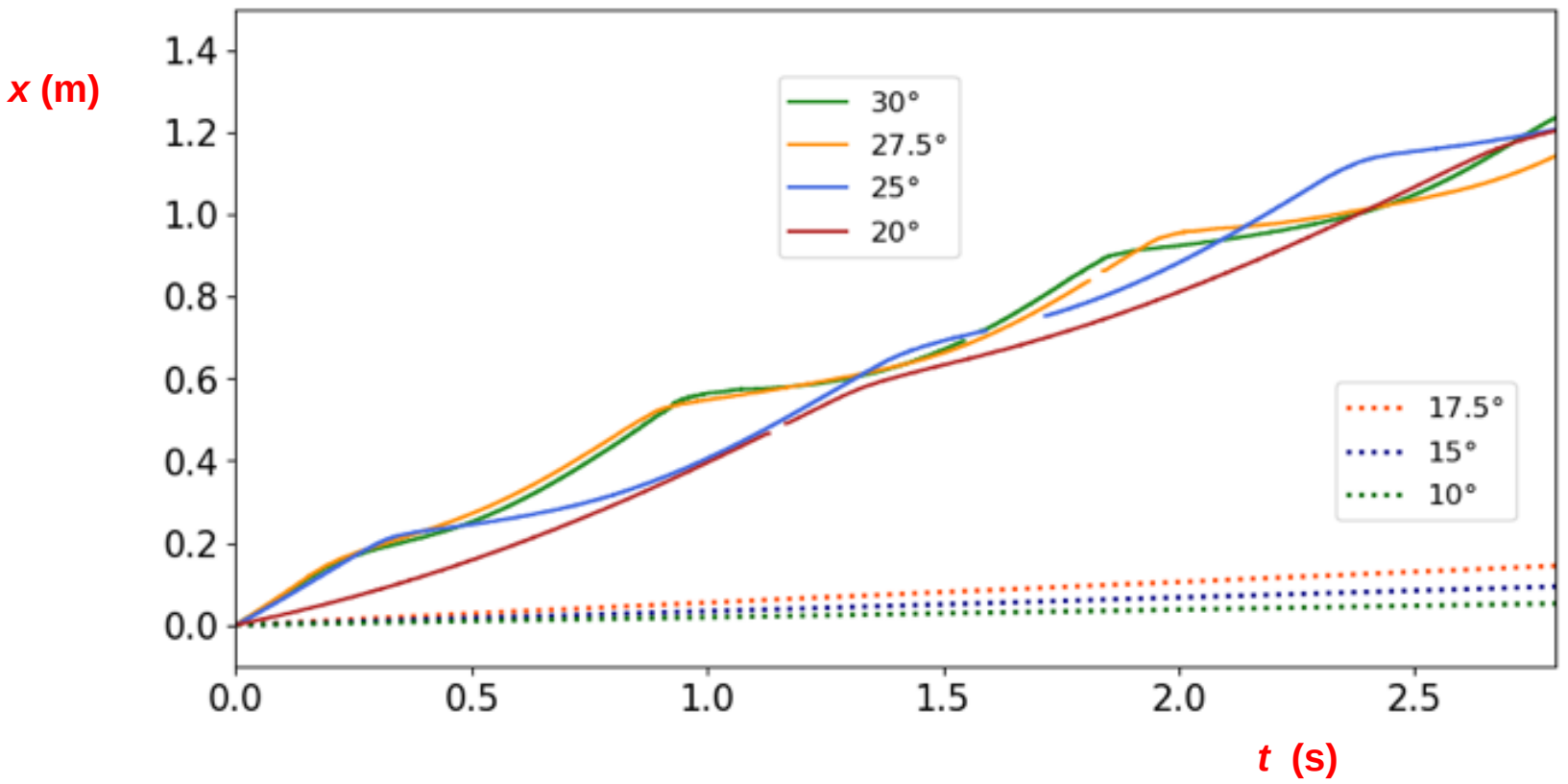
SCHNITZER et al., 2020

VISCOUS MARBLES ARE QUICK
BECAUSE THEY ARE SMALL.

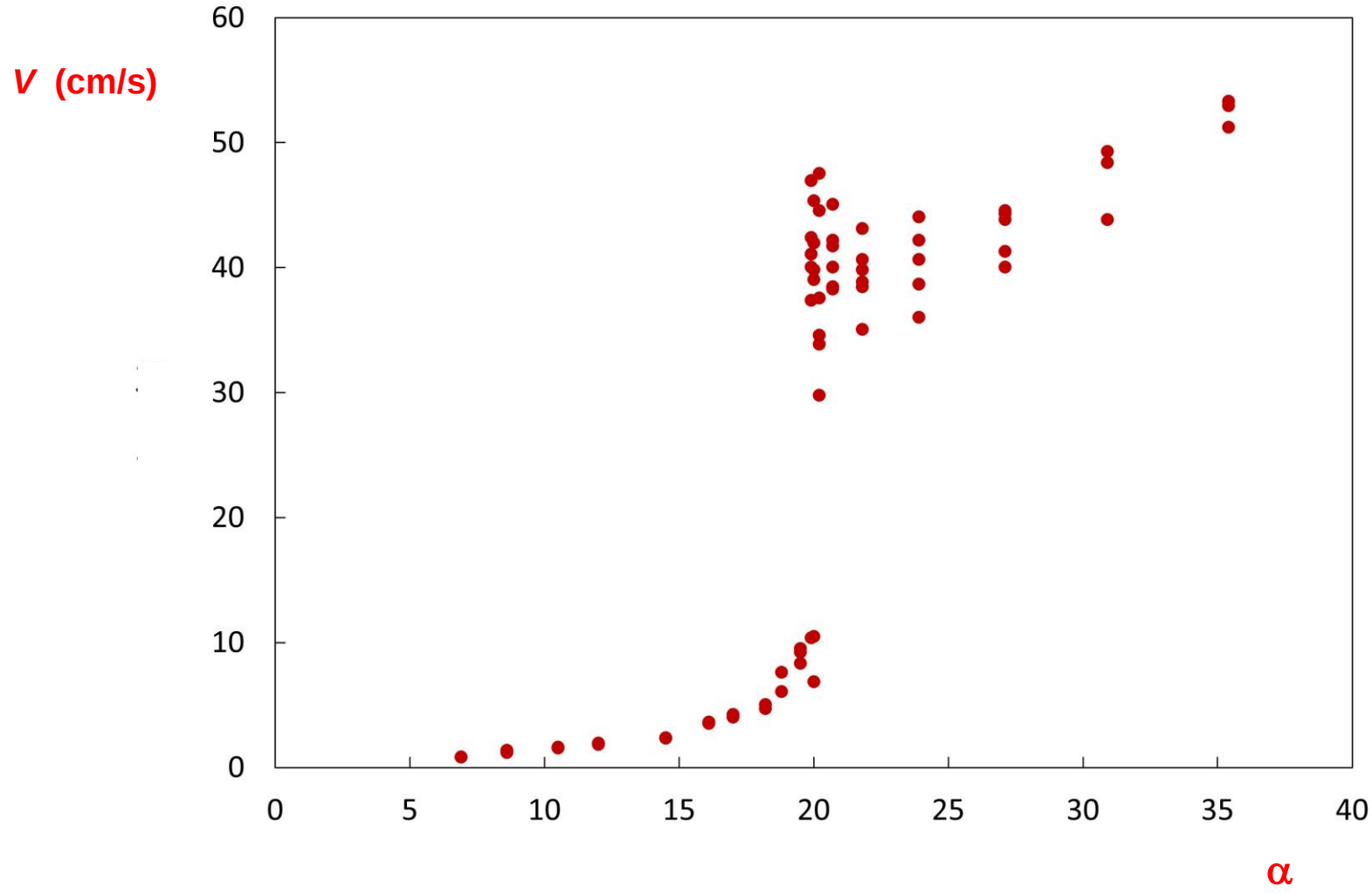
PIKE, 2002



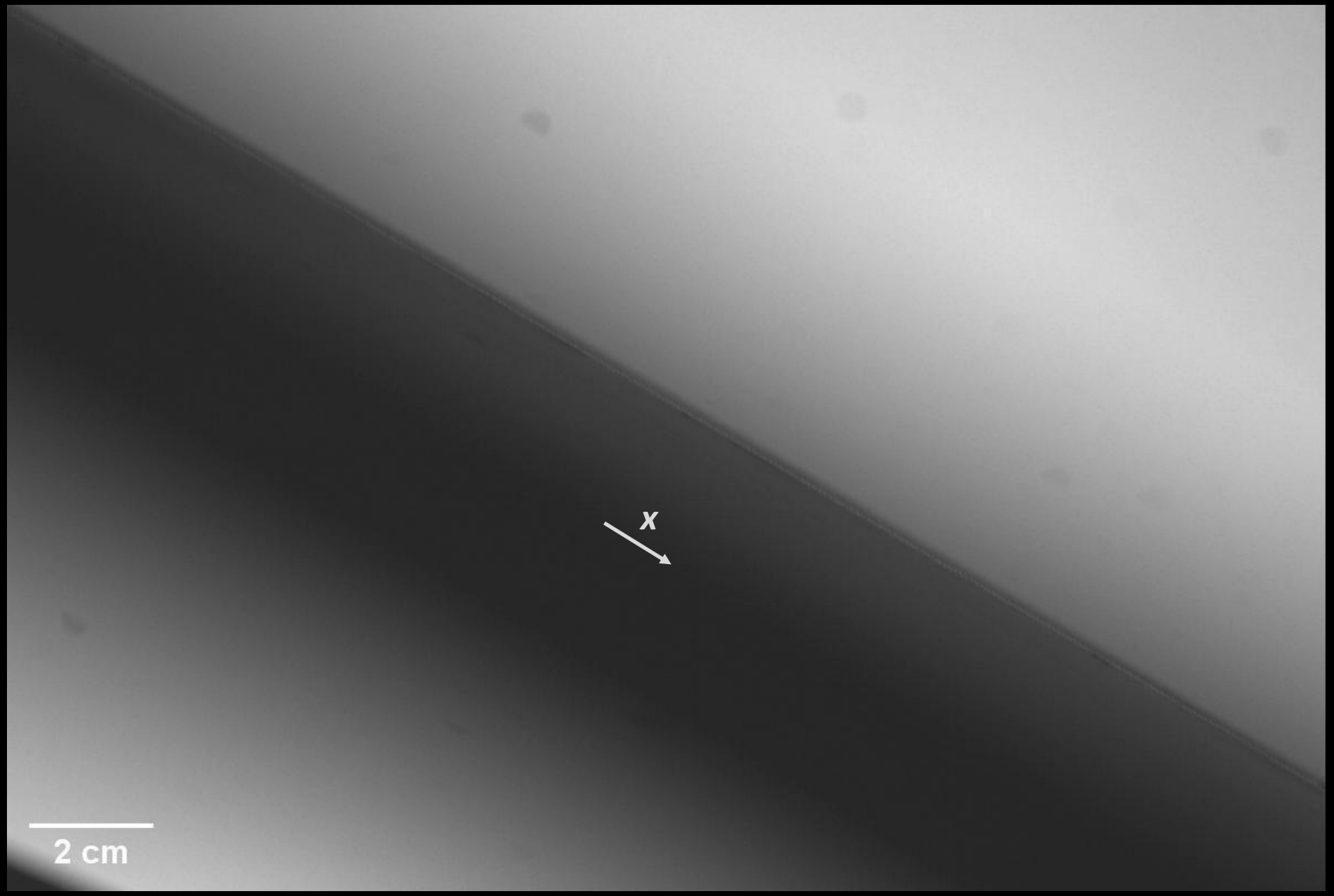
YUI TAKAI, 2023

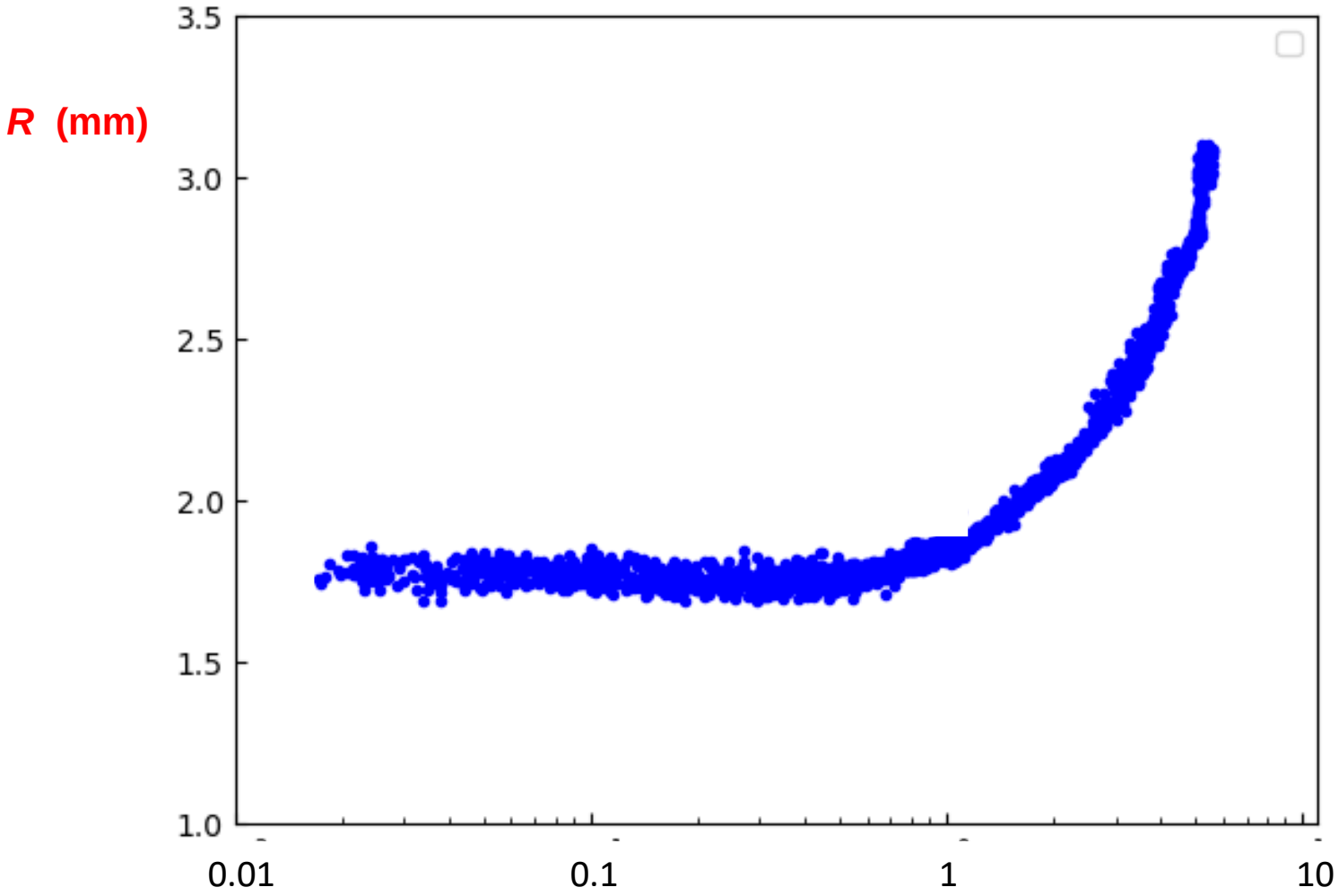


YUI TAKAI, 2023

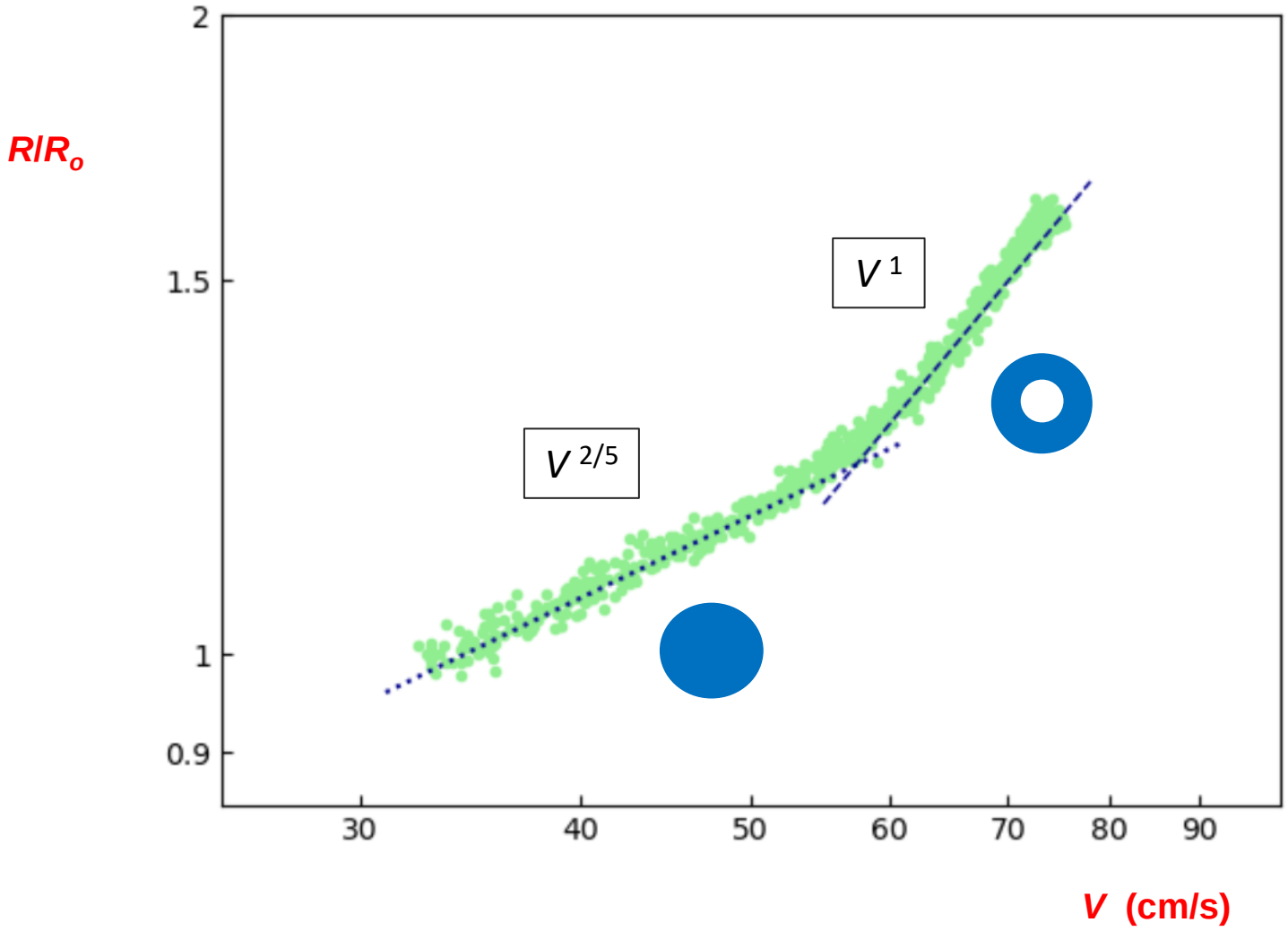


AURIANE HUYGHUES DESPOINTES, 2024

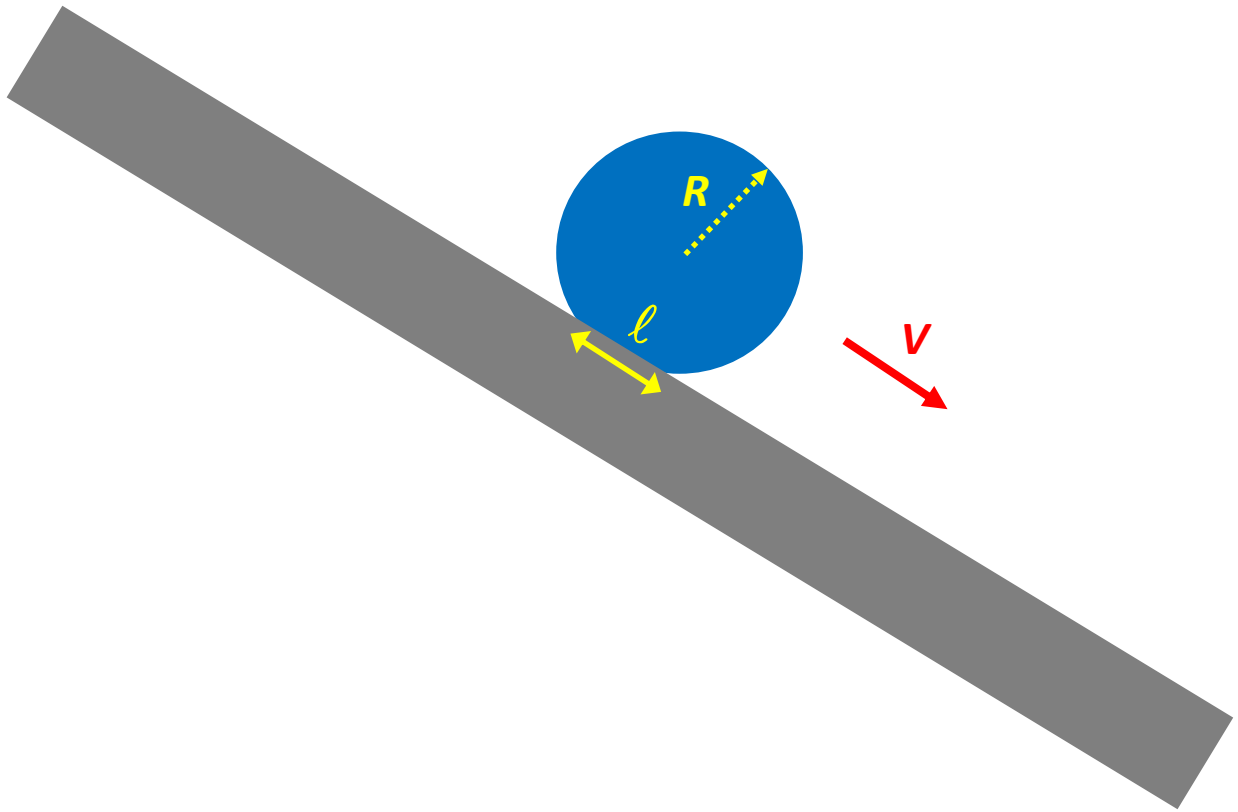

x
2 cm



AURIANE HUYGHUES DESPOINTES, 2023

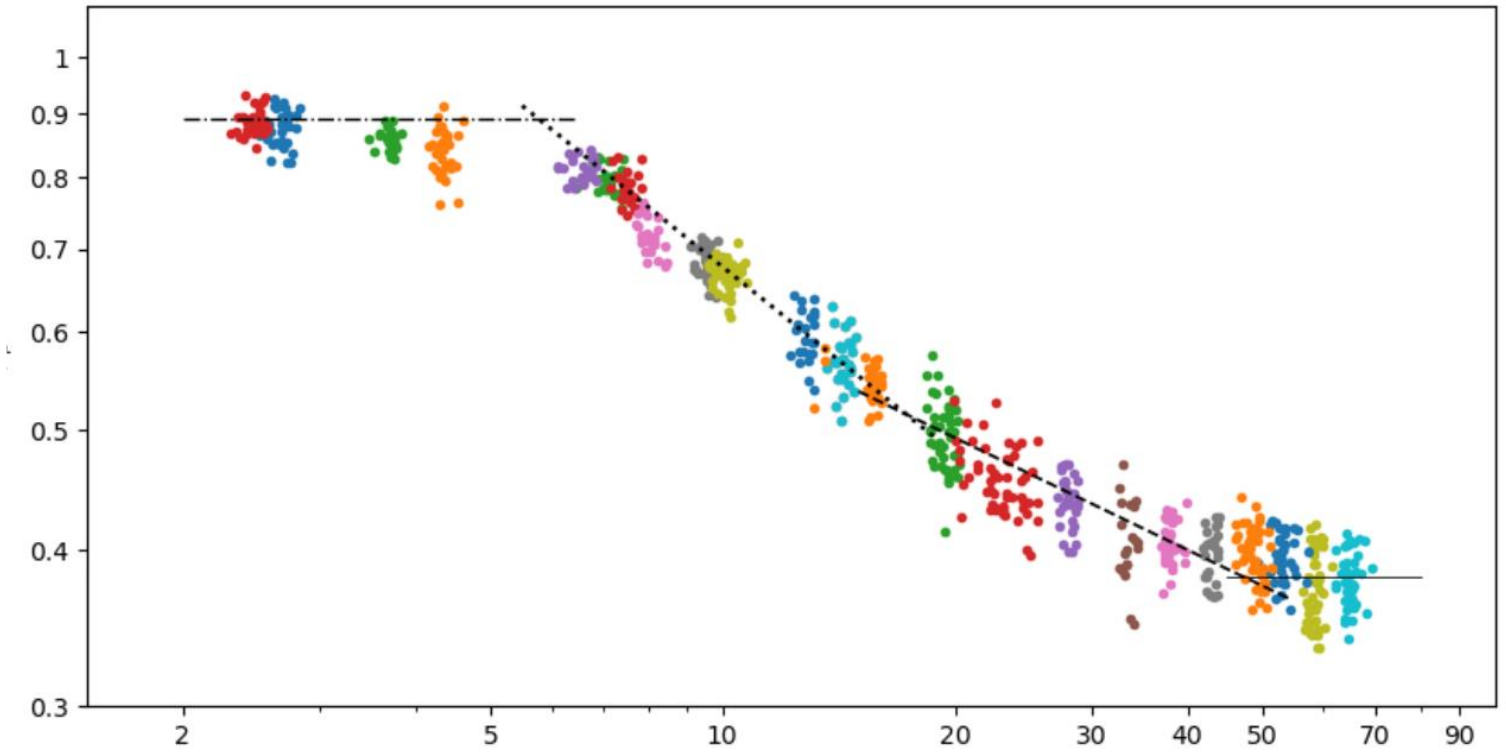


AURIANE HUYGHUES DESPOINTES, 2024



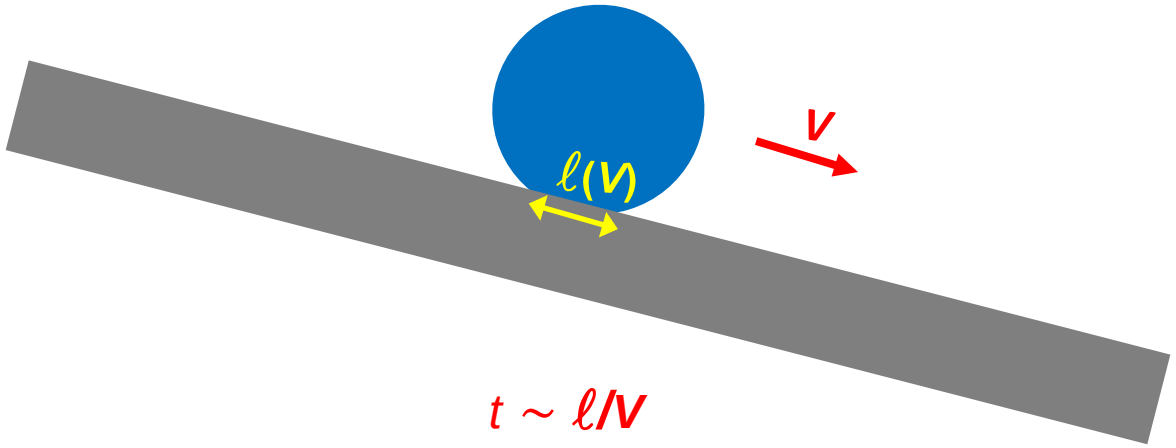
$$F \sim (\eta V/R)\, \ell^2$$

$\frac{\ell}{R^2/a}$

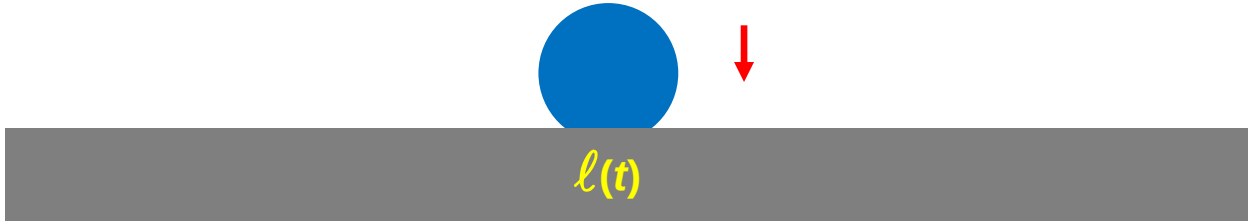


V (cm/s)

AURIANE HUYGHUES DESPOINTES, 2024

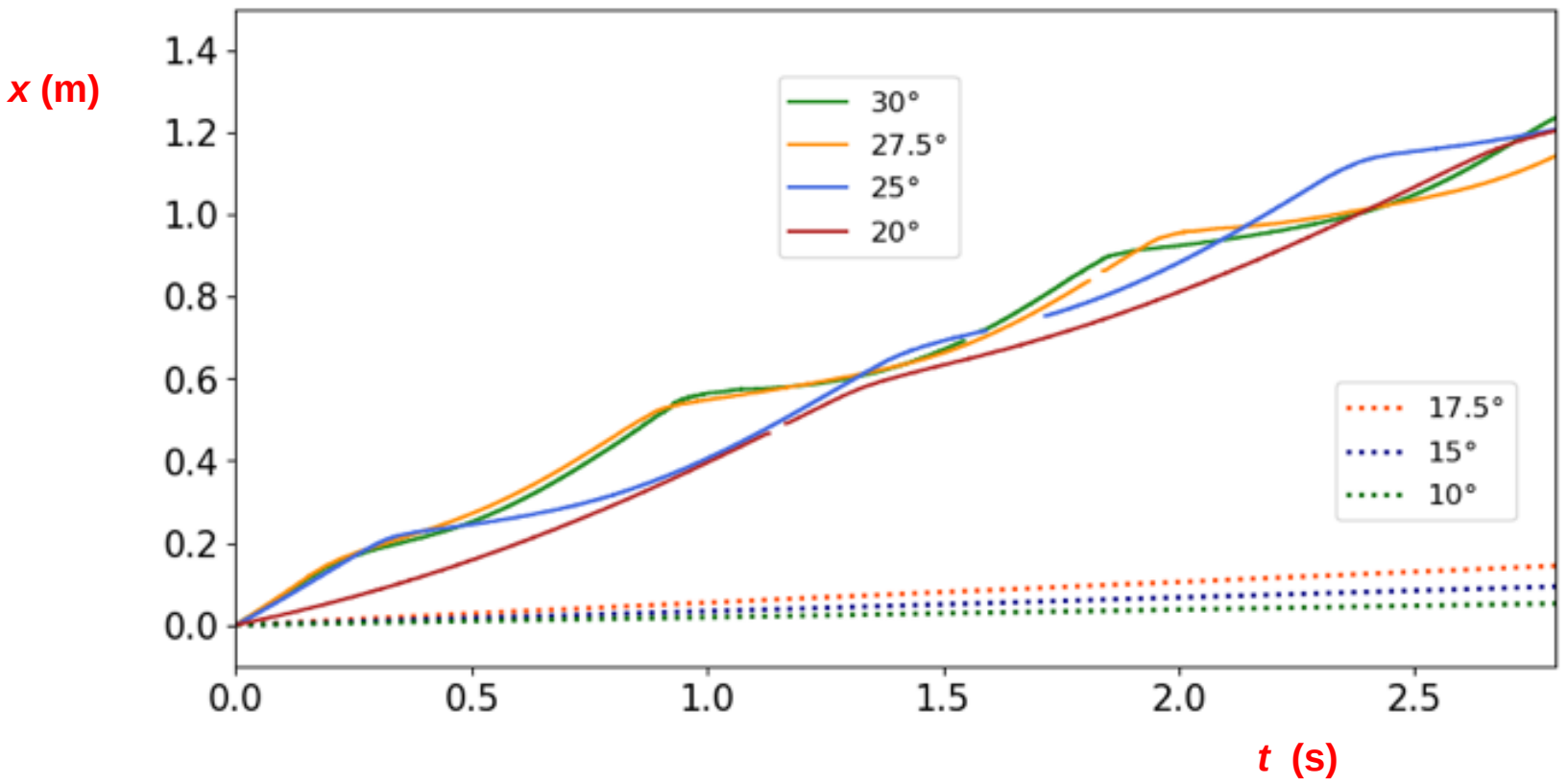


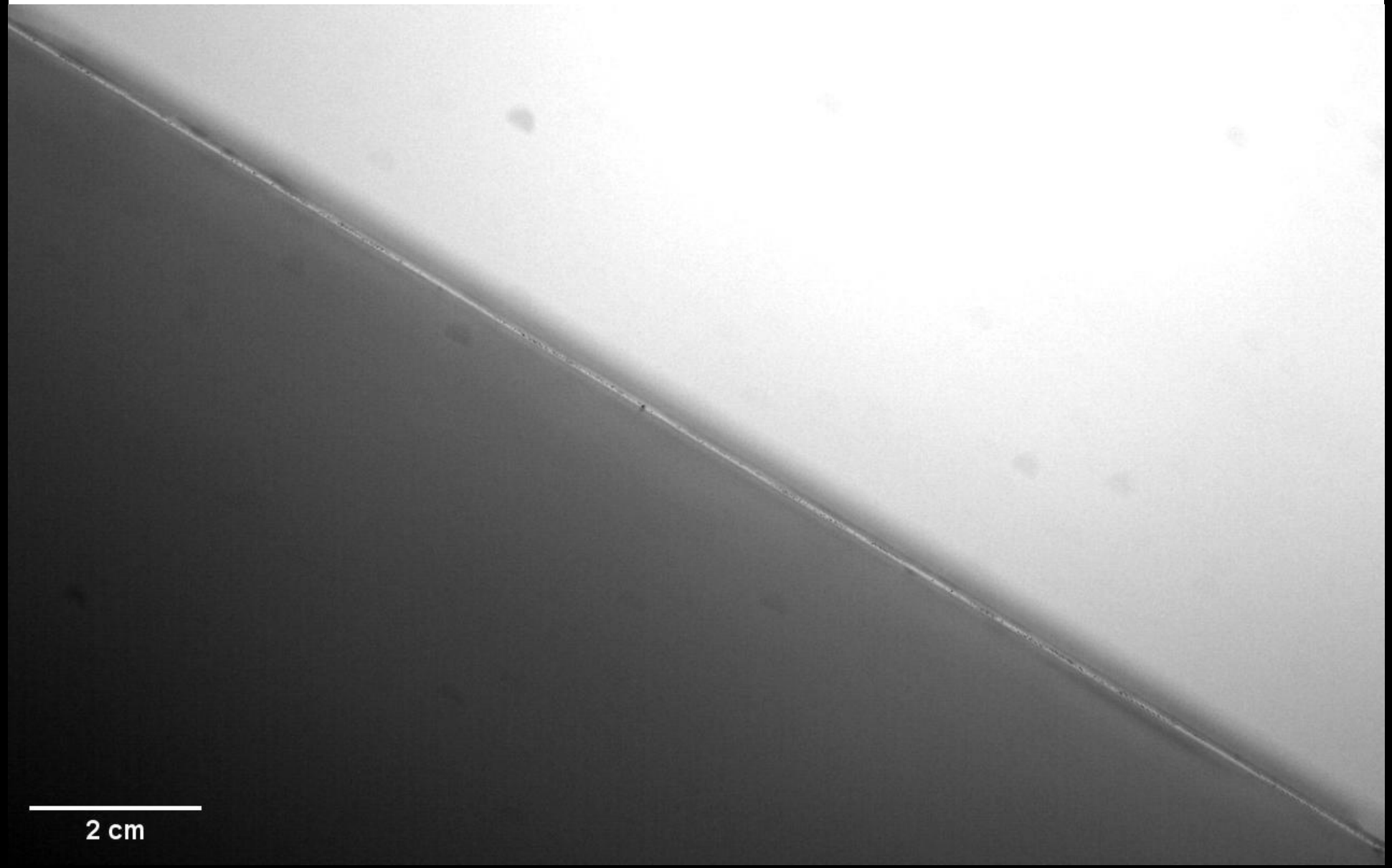
$t \sim \ell/V$



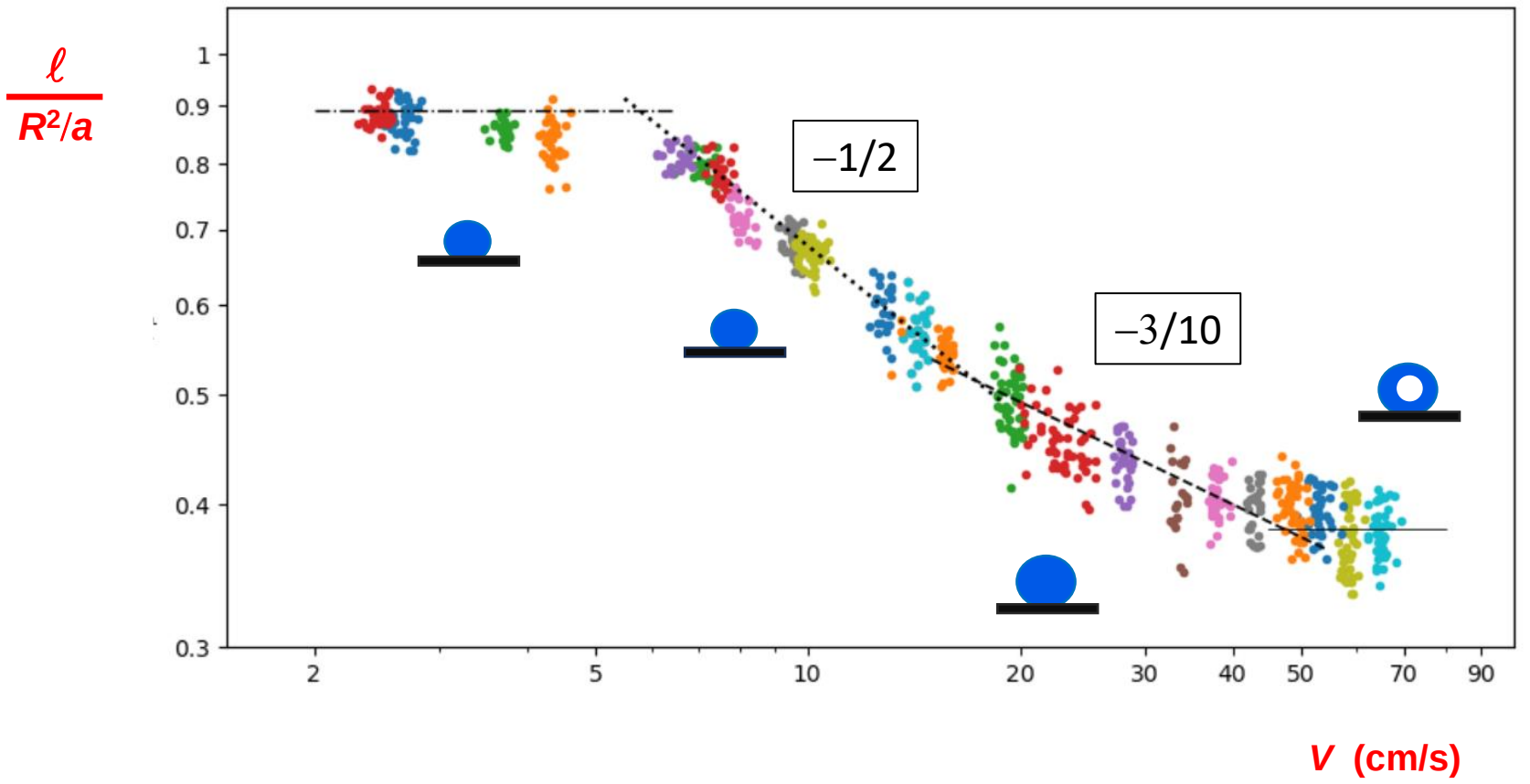
$\ell \sim (t/\eta)^{1/3}$

VISCOUS MARBLES ARE QUICK
BECAUSE THEY ARE VISCOUS.

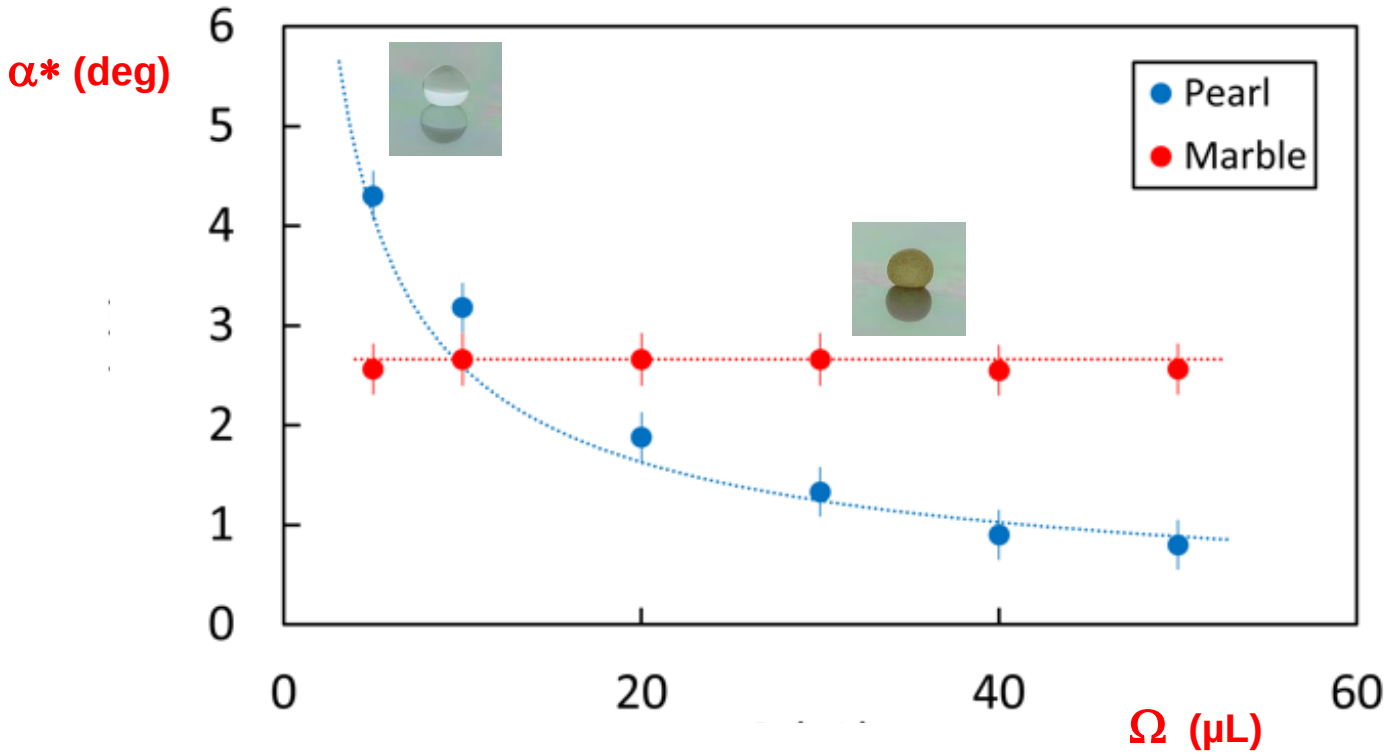

x (m)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.5
1.0
1.5
2.0
2.5
t (s)
30°
27.5°
25°
20°
17.5°
15°
10°


2 cm

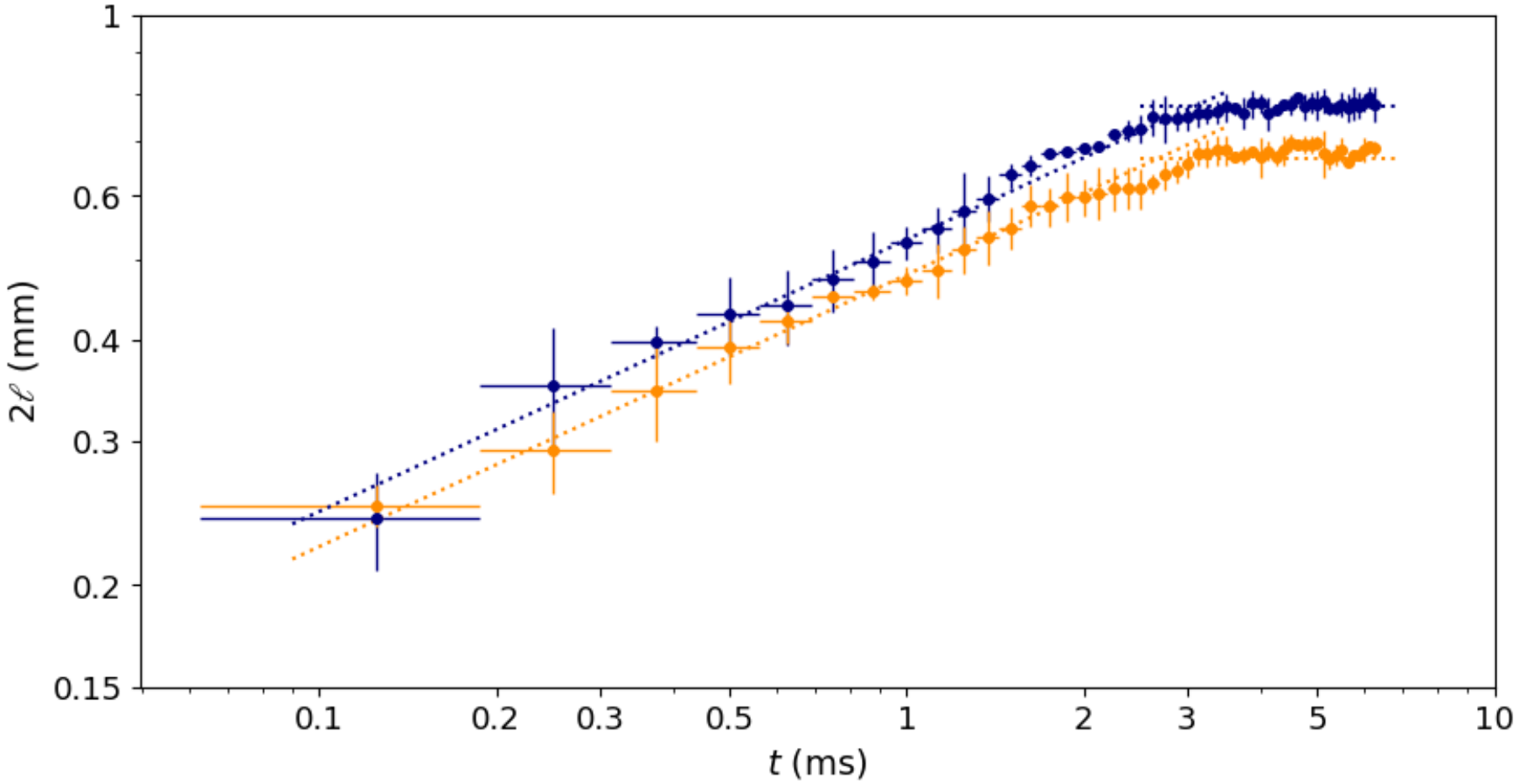
CHANDRASEKHAR, 1961



AURIANE HUYGHUES DESPOINTES, 2024



KEXIN ZHAO, 2023



AURIANE HUYGHUES DESPOINTES, 2024