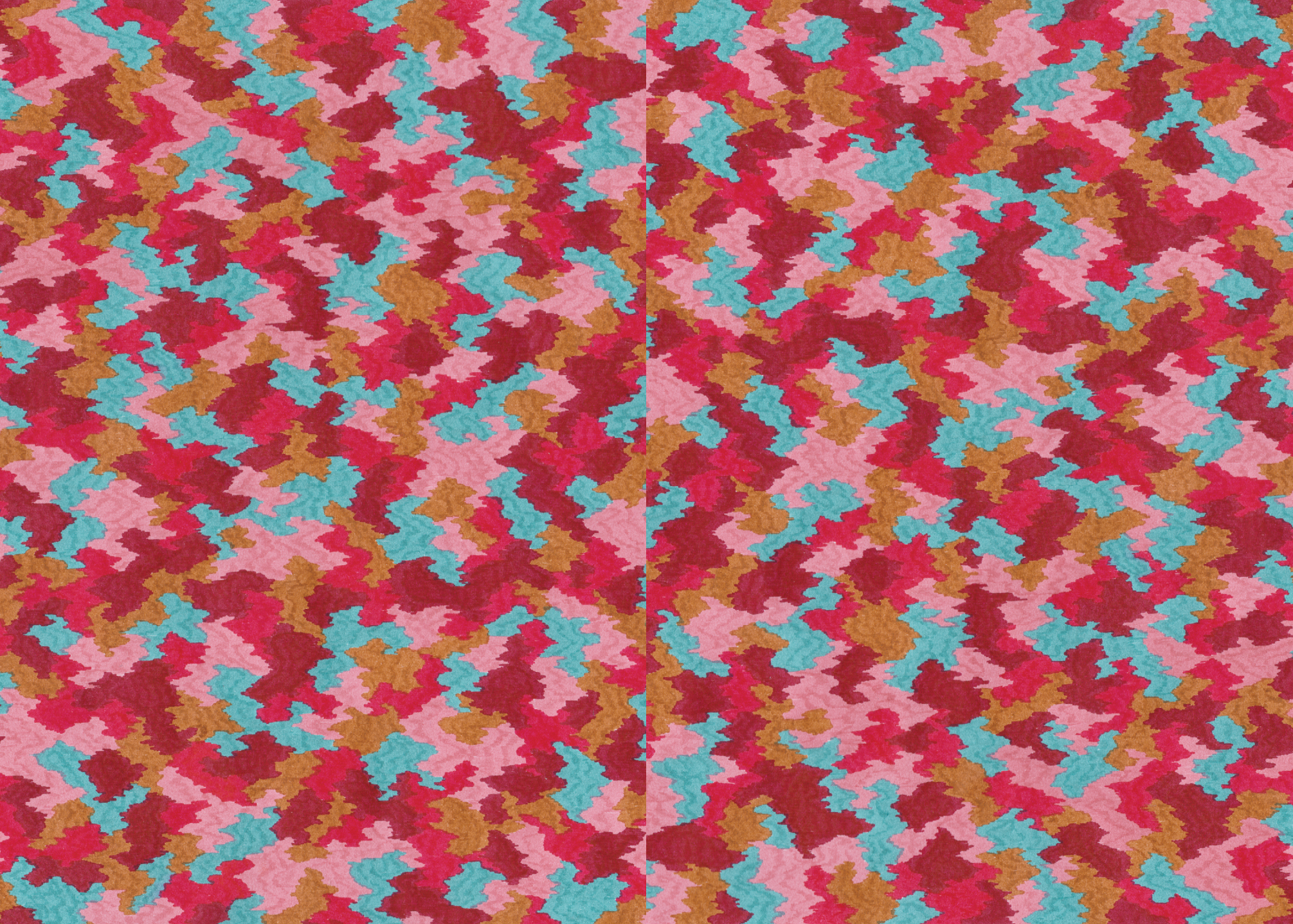
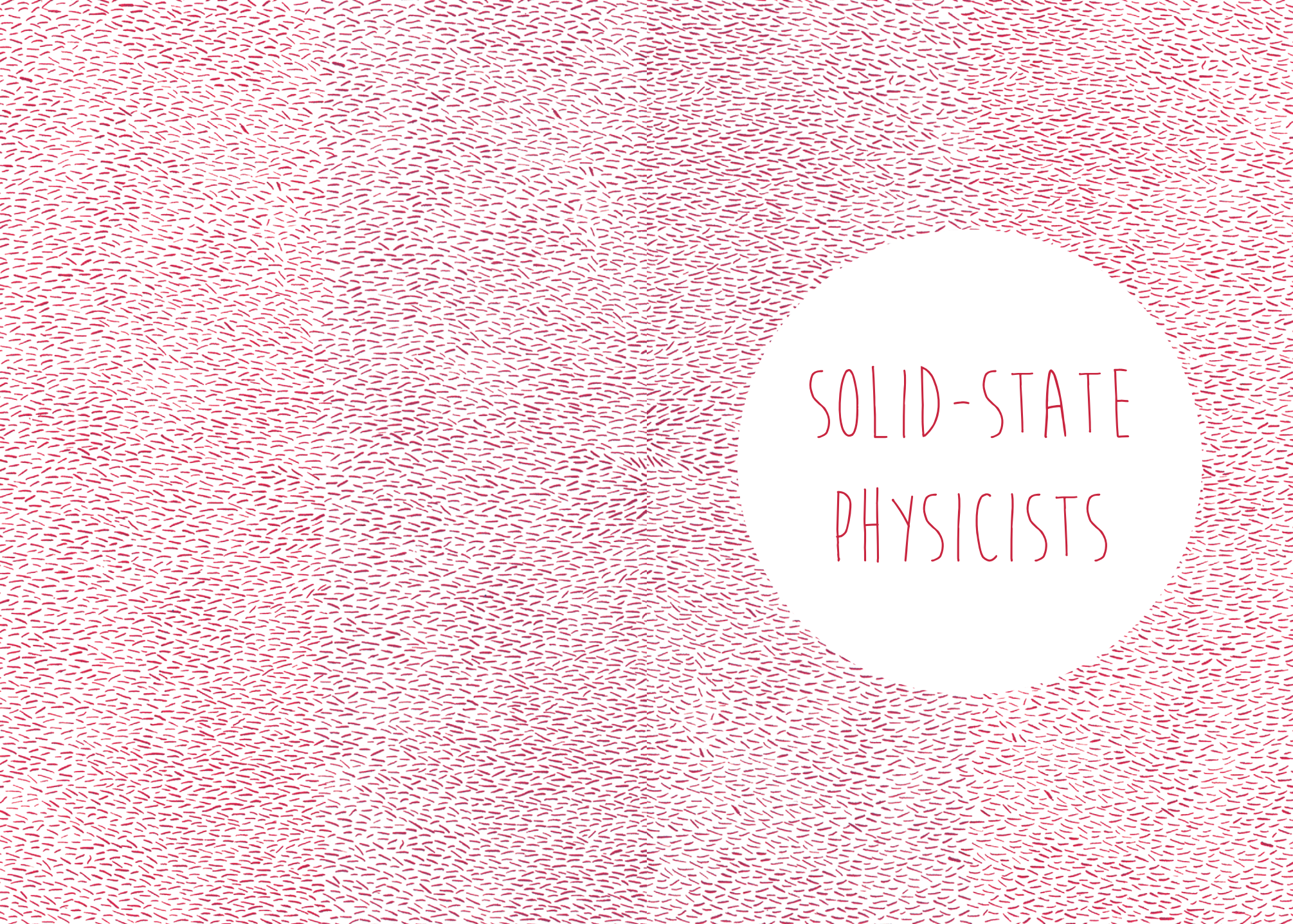


SOLID-STATE PHYSICISTS
LORÈNE





SOLID-STATE
PHYSICISTS

LORÈNE



PHD STUDENT AT THE LABORATORY OF SOLID-STATE PHYSICS (LPS)

TEAM : LIQUID INTERFACES

24 YEARS OLD

WORKS ON SOAP FILMS



MY INTEREST IN PHYSICS GOES BACK A LONG TIME. BOTH MY PARENTS HAD JOBS IN SCIENCE, SO I GUESS I WAS BORN FOR IT. WHEN I WAS A KID, I WAS ALWAYS READING SCIENTIFIC MAGAZINES FOR CHILDREN. ALL THROUGH HIGH SCHOOL, I HAD BOTH A SCIENTIFIC AND LITERARY MIND, AND AT ONE POINT, I HAD TO MAKE A CHOICE. I CHOSE SCIENCE BECAUSE IT WAS WHAT I HAD ALWAYS WANTED TO DO, AND I KNEW THAT I WOULD THRIVE IN IT.



LIKE A LOT OF SCIENTISTS, I'M A GREAT FAN OF THE FIRST STAR WARS MOVIES, BUT I HATE THE NEW ONES (THEY REALLY SUCK). I GUESS I BELONG TO THE GEEK/SCIENTIST UNIVERSE AND ITS CULTURAL REFERENCES. I THINK WHEN YOU START STUDYING SCIENCE, THE INTEREST FOR SCIENCE-FICTION COMES NATURALLY. IT'S NOT AN ESTABLISHED RULE, BUT IT'S A LOGICAL EXTENSION OF THE SCIENTISTS' FANTASIES, OF HOW THEY WOULD LIKE TO CHANGE THE WORLD.



FOR ALMOST TEN YEARS IN MY LIFE, I'D WANTED TO STUDY ASTROPHYSICS. I THOUGHT IT WOULD BE AWESOME : WHEN YOU WATCH THE STARS, YOU'RE LIKE : "WOW! THAT'S WHAT I WANT TO DO!" AND THEN, 2 OR 3 YEARS AGO, DURING AN INTERNSHIP, I REALIZED I HATED ASTROPHYSICS!



I HAD ALREADY APPROACHED THE SUBJECT OF SOFT MATTER DURING ANOTHER INTERNSHIP WHERE WE WORKED ON GRAINS OF SAND, WITH TINY MOLDS TO CONTROL THE THICKNESS. IT WAS SO MUCH FUN. AND I HAD TO WAIT TILL THAT INTERNSHIP IN ASTROPHYSICS TO REALIZE THAT : "YEAH, SAND WAS WAY BETTER !"



I BELONG TO THE ONLY GROUP IN THE LAB WHERE THERE IS A MAJORITY OF WOMEN. THE LAB IS NOT A PARTICULARLY SEXIST WORLD. AND IN MY TEAM, MEN BEHAVE!



IN MY LAB, I ALWAYS WEAR A MASK WHEN I WORK WITH CHLOROFORM. IT LOOKS KIND OF SCARY, BUT IT'S NOT UNCOMFORTABLE.



SOMETIMES, WE HANDLE REALLY DANGEROUS PRODUCTS, AND PEOPLE TEND TO FREAK OUT WHEN I WALK IN THE HALL WITH MY MASK ON!



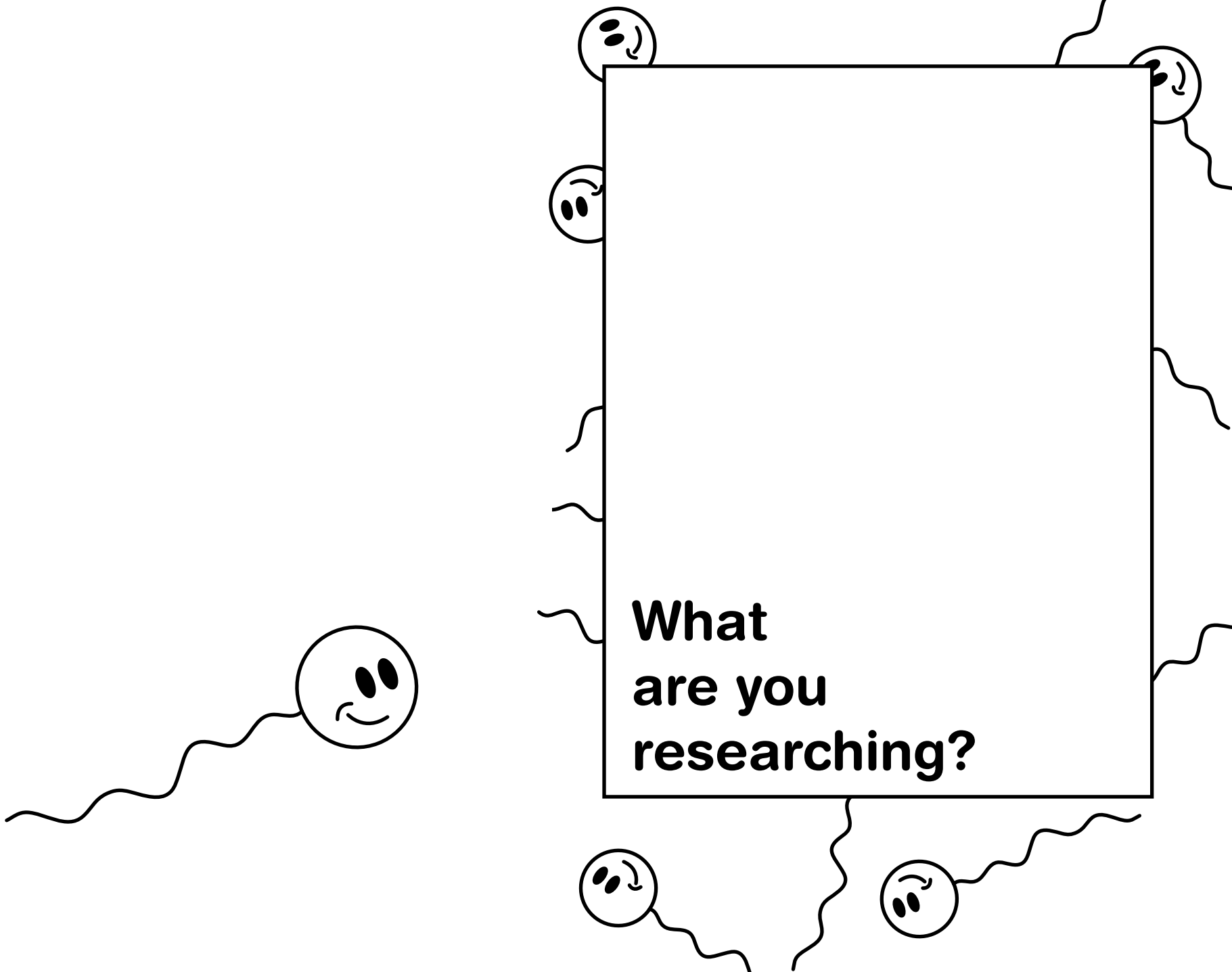
IN THE LAB, I LIKE WHEN IT'S TIDY. I LOVE TO PUT LABELS ON THINGS. IT SOOTHES ME!



IF YOU WANT TO BECOME A RESEARCHER, THERE ARE A COUPLE REQUIREMENTS: YOU CAN'T BE A RESEARCHER AND NOT LIKE WHAT YOU DO. IF YOU DON'T THINK IT'S FUN, DON'T BOTHER. THE MOST IMPORTANT THING FOR A RESEARCHER IS COMMUNICATION: IT'S POINTLESS TO BE A GENIUS IF YOU CAN'T EXPLAIN WHAT YOU DO TO OTHERS.

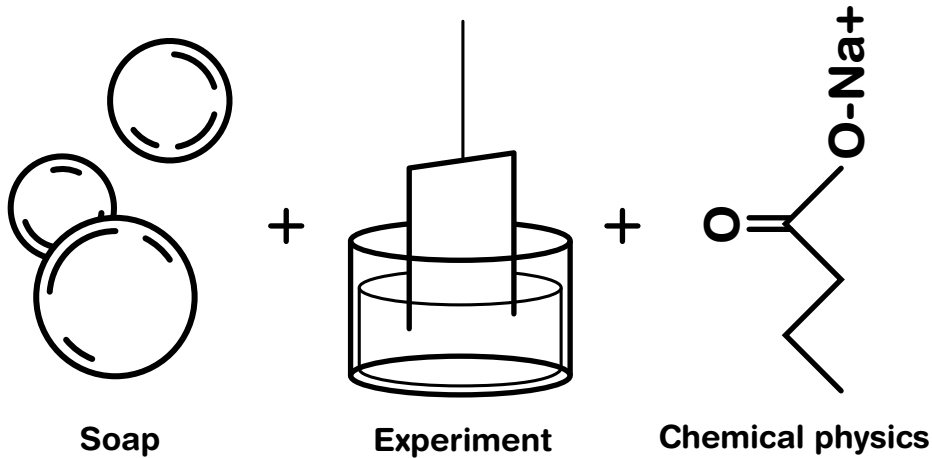


IF YOU CAN'T EXPLAIN YOUR FIELD OF RESEARCH TO PEOPLE WHO ARE NOT SCIENTISTS OR WHO DO NOT WORK IN THE SAME AREA, HOW CAN YOU BE USEFUL? IN MY OPINION, A RESEARCHER WHO CAN'T COMMUNICATE IS NOT A REAL RESEARCHER. I GIVE LECTURES IN HIGH SCHOOL, I CONVEY WHO RESEARCHERS ARE... IT'S A WAY TO PLANT LITTLE SEEDS IN THE PUPILS' MINDS, LITTLE CURIOSITY SEEDS THAT I BELIEVE TO BE VERY IMPORTANT.



**What
are you
researching?**

**Life and death of a soap film.
That is the subject Lorène
has been working on.**

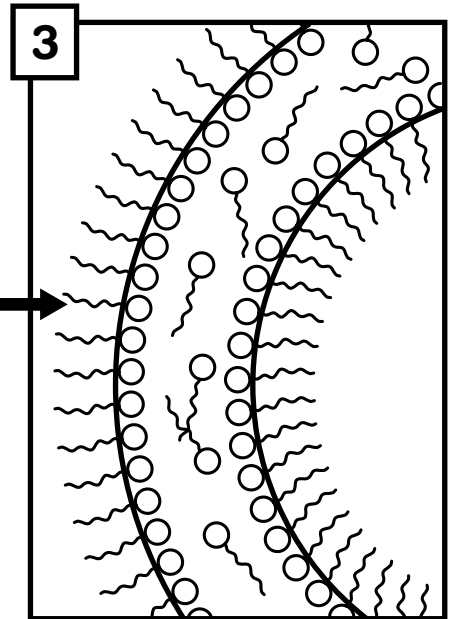
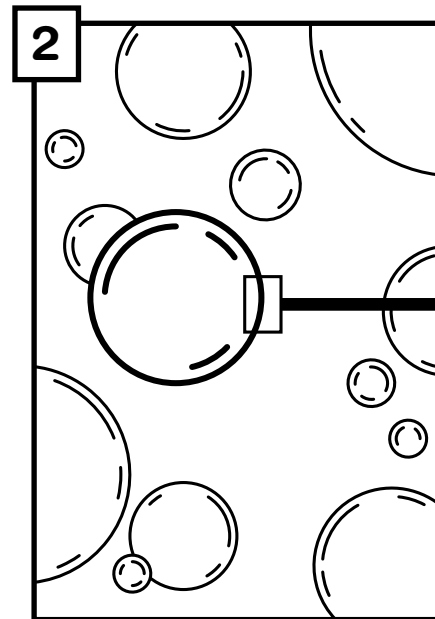
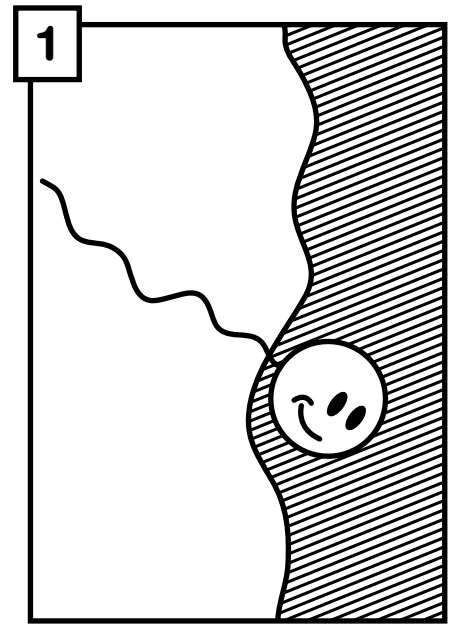


Soap

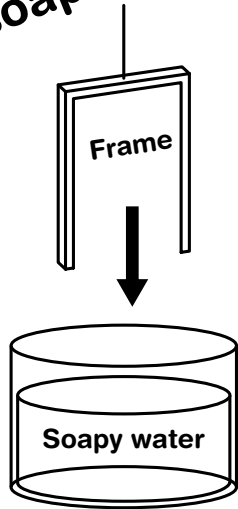
1 — What is soap? Soap is composed of molecules with a hydrophilic head (which likes water) and a hydrophobic tail (which doesn't like water).

2 — A soap bubble is a mix of soap and water.

3 — In this mix, the soap molecules organize themselves in order to form the side of the bubble.



Life and death of a soap film

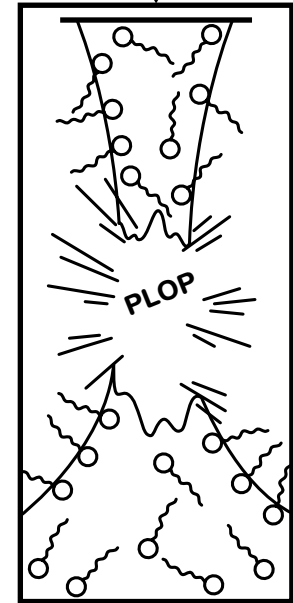
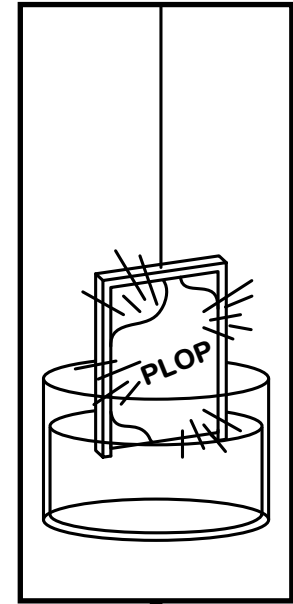
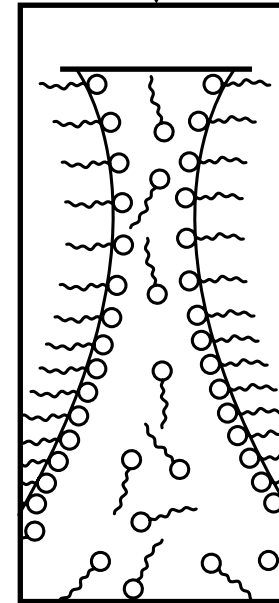
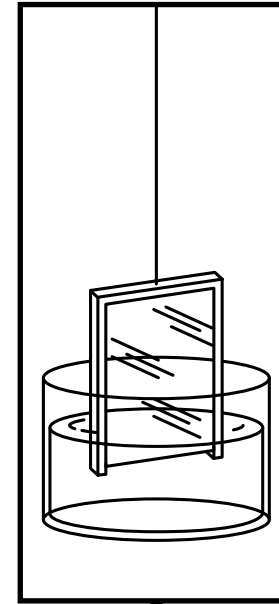
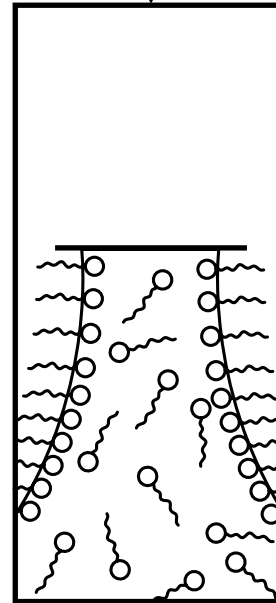
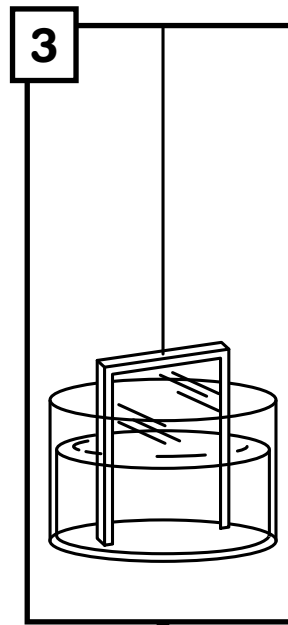
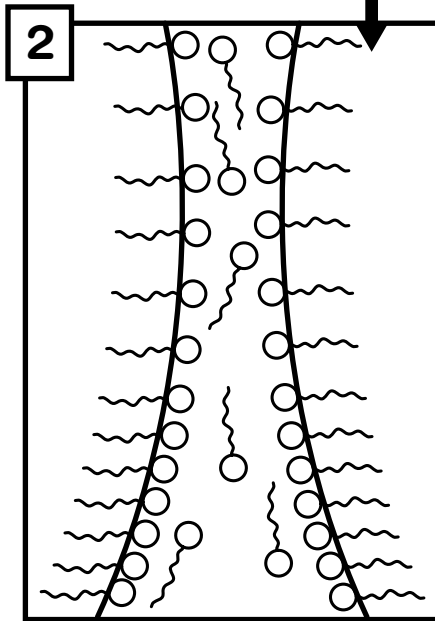
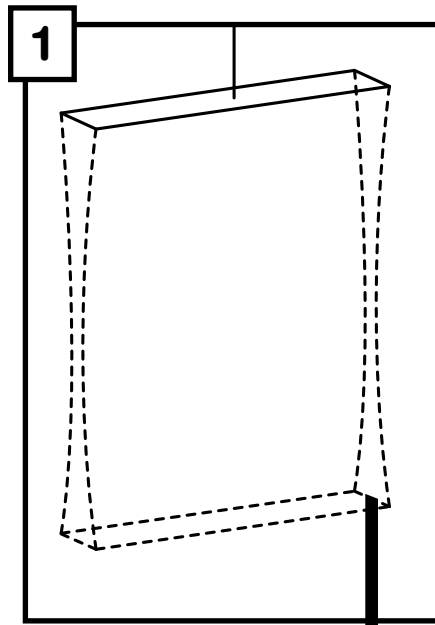


In order to understand the evolution of a soap film, Lorène makes an experiment and plunges a frame in soapy water.

1 — The film hangs on the sides of the frame.

2 — Sectional view of the soap film: there are fewer soap molecules at the top because the liquid flows toward the bottom of the frame.

3 — Life and death of a soap film. The film bursts at its thinnest part.



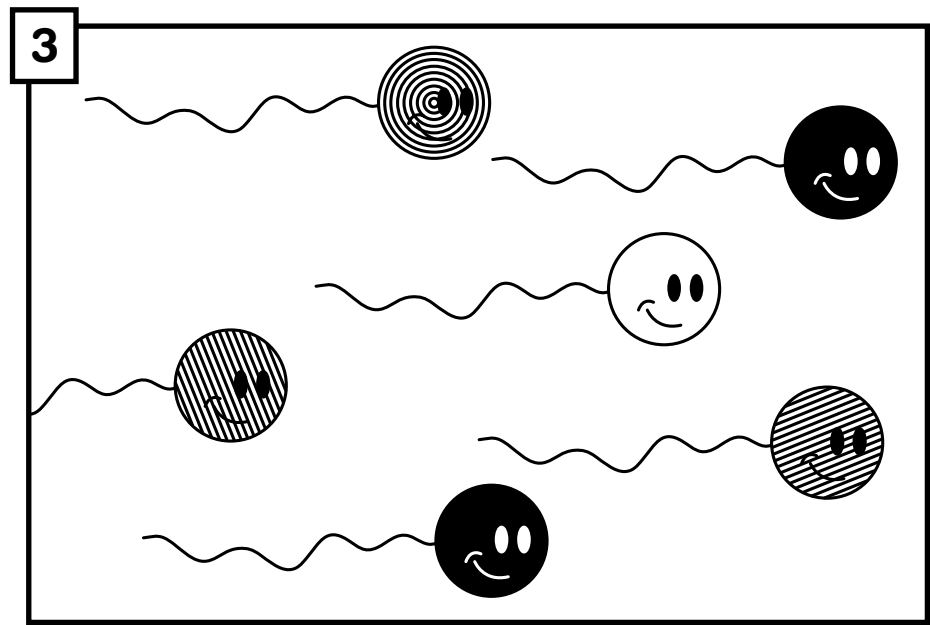
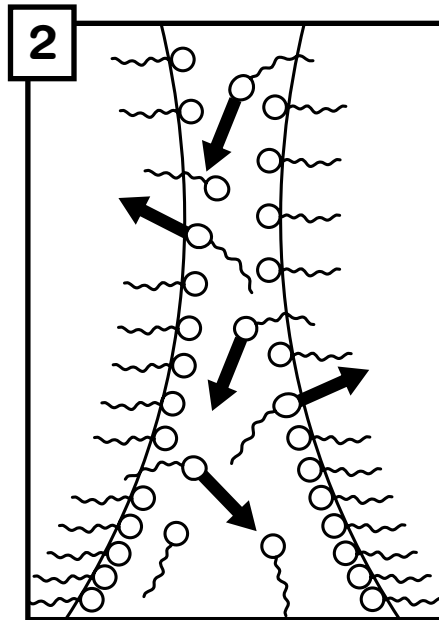
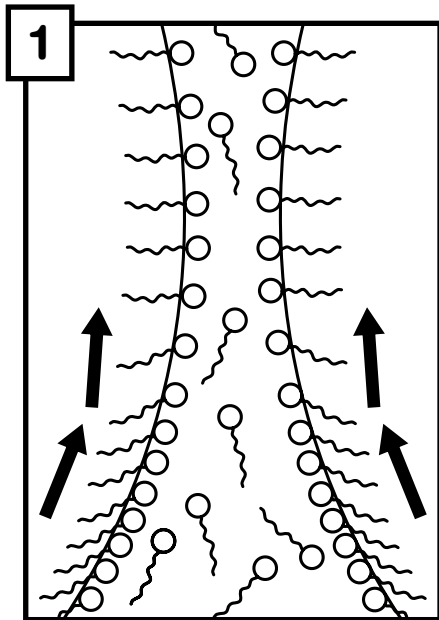
The mechanisms at work within the film

There are two effects at once:

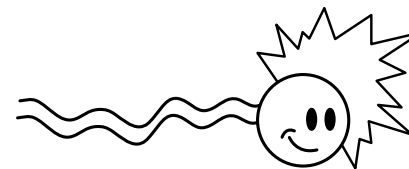
1 — The molecules on the surface of the film tend to go up, where there are less of them. This is caused by what is known as the “Marangoni effect”.

2 — Certain molecules that were not on the surface of the film decide to go there. In return, other molecules that were on the surface go back in the other direction.

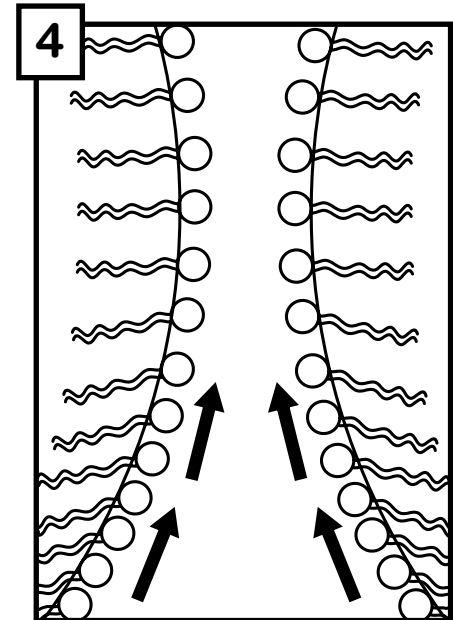
3 — In order to understand the importance of these two effects, Lorène compares different films made from different soap molecules.

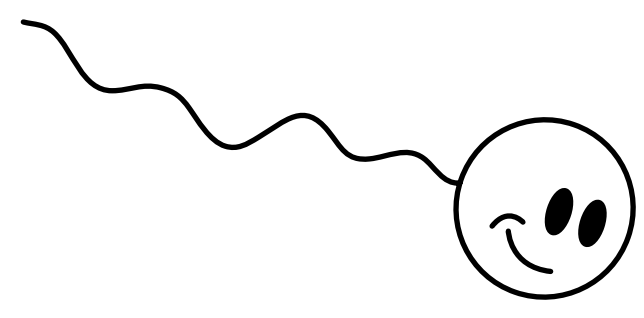
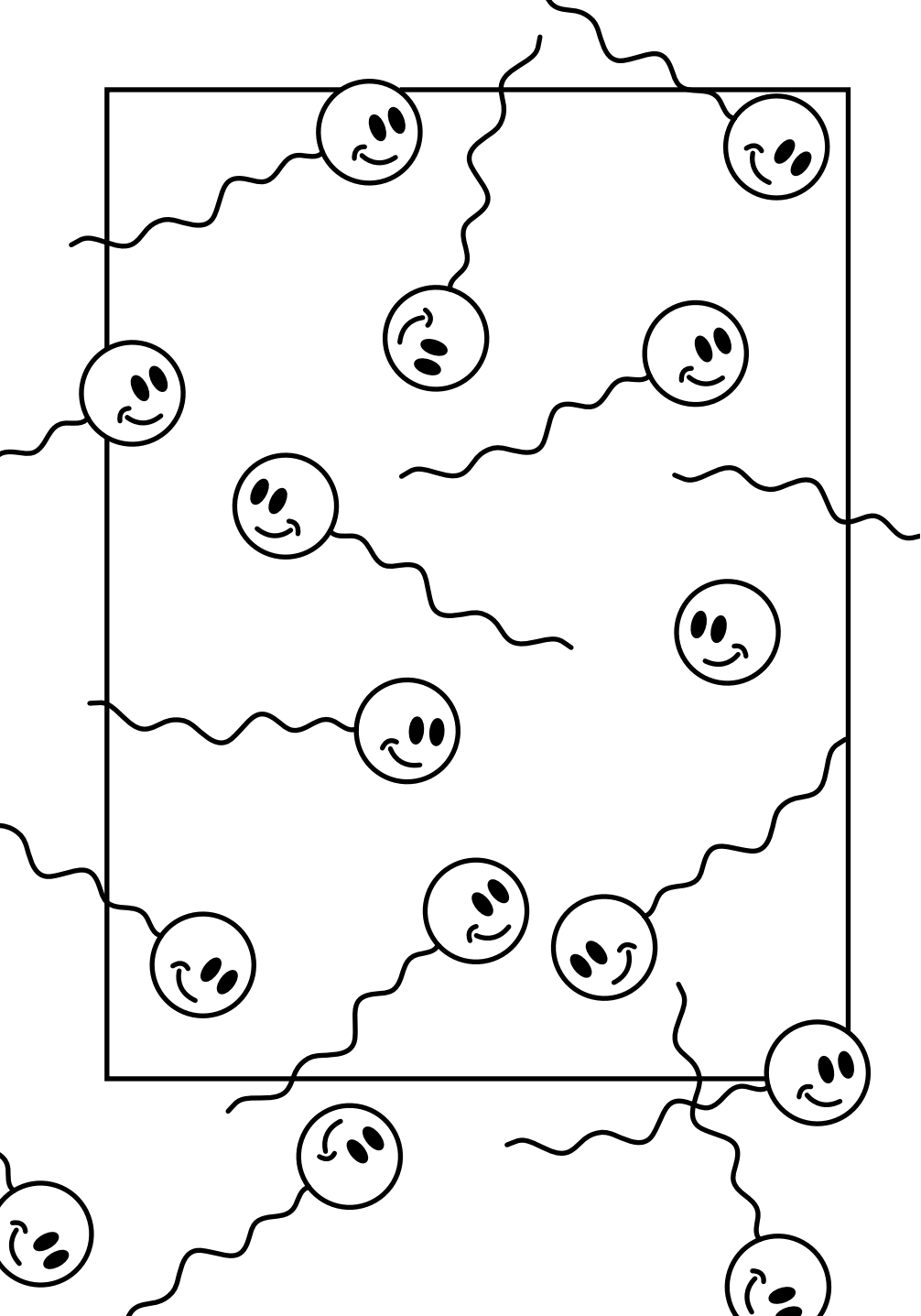


4 — She uses certain special molecules with two tails, which cannot enter the heart of the film. This enables her to simplify the problem. Although it is still pretty tough to understand!



Special molecule





A CREATION BY CHLOÉ PASSAVANT,
AS PART OF HER DSAA SCIENTIFIC ILLUSTRATION DESIGN DEGREE,
WITH THE COOPERATION OF JULIEN BOBROFF (UNIVERSITÉ PARIS-SUD, CNRS)
THIS WORK WAS CONDUCTED AT THE LABORATORY OF SOLID-STATE PHYSICS (LPS)
IN ORSAY, WITH FABRICE BERT, LORÈNE CHAMPIGNY, MARK-OLIVER GOERBIG.
I WOULD LIKE TO THANK THEM FOR TAKING PART IN THAT PROJECT.

TRANSLATION : PIERRE SZCZECINER
WE THANK ICAM-IZCAM FOR THEIR FINANCIAL SUPPORT.

JUNE 2014

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