

#PHYSICS

Why Champagne Bubbles Fizz Straight Up?

Bubbly flows in the field of fluid mechanics



New research explains why bubbles in Champagne fizz up in a straight line while bubbles in other carbonated drinks, like beer or soda, don't.

The results not only explain what gives Champagne its line of bubbles but may hold important implications for understanding bubbly flows in the field of fluid mechanics.

"This is the type of research that I've been working out for years," says Roberto Zenit, engineering professor at Brown University and senior author of the study in the journal Physical Review Fluids.

"Most people have never seen an ocean seep or an aeration tank but most of them have had a soda, a beer, or a glass of Champagne. By talking about Champagne and beer, our master plan is to make people understand that fluid mechanics is important in their daily lives."

Bubble Chains

The team's goal was to investigate the stability of bubble chains in carbonated drinks. Part of the signature experience of enjoying these beverages is the tiny or large bubbles that form when the drink is poured, creating a visible chain of bubbles and fizz.



Depending on the drink and its ingredients, the fluid mechanics involved are all different.

When it comes to Champagne and sparkling wine, for instance, the gas bubbles that continuously appear rise rapidly to the top in a single-file line and keep doing so for some time. This is known as a stable bubble chain. With other carbonated drinks, like beer, many bubbles veer off to the side, making it look like multiple bubbles are coming up at once. This means the bubble chain isn't stable.

The researchers set out to explore the mechanics of what makes bubble chains stable and if they could recreate them, making unstable chains as stable as they are in Champagne or prosecco.

The results of their experiments indicate that the stable bubble chains in Champagne and other sparkling wines occur due to ingredients that act as soap-like compounds called surfactants. These surfactant-like molecules help reduce the tensions between the liquid and the gas bubbles, making for a smooth rise to the top.

"The theory is that in Champagne these contaminants that act as surfactants are the good stuff," Zenit says. "These protein molecules that give flavour and uniqueness to the liquid are what makes the

bubbles chains they produce stable."

Size Matters

The experiments also showed the size of the bubbles themselves affect the stability of the bubbles. They found that the chains with large bubbles have a wake similar to that of bubbles with contaminants, leading to a smooth rise and stable chains.

In beverages, however, bubbles are always small. It makes surfactants the key ingredient to producing straight and stable chains. Beer, for example, also contains surfactant-like molecules but, depending on the type of beer, the bubbles can rise in straight chains or not. In contrast, bubbles in carbonated water are always unstable since there are no contaminants to help the bubbles move smoothly through the wake flows left behind by the other bubbles in the chain.

"This wake, this velocity disturbance, causes the bubbles to be knocked out," Zenit says. "Instead of having one line, the bubbles end up going up in more of a cone."

Technologies that use bubble-induced mixing, like aeration tanks at water treatment facilities, for instance, would benefit greatly from researchers having a clearer understanding of how bubbles cluster, their origins and how to predict their appearance. In nature, understanding these flows may help better explain ocean seeps in which methane and carbon dioxide emerges from the bottom of the ocean.

Champagne vs Beer Bubbles

To study the bubble chains and what goes into making them stable, researchers filled a small rectangular plexiglass container with liquid and inserted a needle at the bottom so they could pump in gas to create different kinds of bubble chains.

The researchers then gradually added surfactants or increased bubble size. They found that when they made the bubbles larger, they could make unstable bubble chains become stable, even without surfactants. When they kept a fixed bubble size and only added surfactants, they found they could also go from unstable chains to stable ones.

The two experiments indicate that there are two distinct possibilities to stabilize a bubble chain: adding surfactants and making bubbles bigger.



Two from the gang were directed by the leader to escort me to Raja Ramdin and the rest hurriedly proceeded ahead on their mission. We stopped outside a triple story structure before I could go ahead and knock the main door some workers were coming out from the side of the building on seeing they gestured me to wait and went inside, an elderly person of about fifty plus in spotless white kurta pyjama emerges looks directly astonished to see me in shambles gasped KYA VAIDYANTHAN SHAHIB, SAB KHYRIAT: - SIR IS EVERY THING ALRIGHT



CV Vaidyanathan

At times when I happen to view the sun dip below the horizon a sense of nostalgia overcomes, the dark orange sky is reminiscent of the trip to Akbarpur Four Decades Ago, when I had to cross an arable field on foot with a suitcase after alighting in the evening at a deserted Akbarpur railway station. I was in hurry to reach Raja Ramdin residence which according to the station master was about six furlongs, expected to be received and escorted by someone from Raja Ramdin workshop and while talking to the station master of the next train to Kanpur the earliest was past midnight, so I decided to walk the distance as there was no carriage available at the station.

I was with Boruka Textiles (a unit of Transport Corporation of India) a manufacturer of synthetic blended yarn headquartered at Mumbai and I was given an independent charge of marketing. On my second visit to Kanpur I realised the potential of Uttar Pradesh the state provided extremely high percentage of skilled and semi-skilled workers to textile units across the country and the majority of them of them were from weaker sections of society. The state was popular for its tra-



Blended silk printed fabrics.



Blended silk fabrics.



Shuttle with dyed silk yarn for weft weaving.

Being Roughed Up To Get Smooth Silk

Around 80% of silk fibre produced in India is of Mulberry variety with largest production in Karnataka, Andhra Pradesh & Tamil Nadu. Muga Silk is produced in Assam and is a prized possession of our country.

#DADAGIRI

been done by hand. However, the mass production brought by power looms also led to a decline in demand for hand-woven textiles and traditional weaving techniques.

Prized Possession

Bhoruka Textiles the Synthetic Spinning Mills were producing about 450 MT of blended yarn every month of fine and coarse counts and during the spinning process we were also generating standard or waste yarn around 2.25 MT (2250 kg), classified this as disposal yarn. There were two main outlets those days who were offering better rate realisation for standard or disposal yarn one at AKBARPUR and another BHONGIR now in Telangana. The process of weaving fabric from standard synthetic blended yarn is labour-intensive, requiring skilled artisans who have mastered the craft over many years. They use their traditional weaving techniques to ensure that the fabric is strong, durable, and has a soft texture that makes it ideal for everyday use.

I was aware of Bhongir producing high-quality synthetic-blended fabrics, which have become very popular among buyers due to their affordability, versatility, and range of designs. The fabrics produced in Bhongir include sarees, dress material, curtains, bed sheets, and other home furnishing items. The demand for these fabrics increased not only within the country but also globally, making Bhongir a prominent name in the textile industry.

Eri Silk found mainly in North East India and some part of China and Japan. The name "Eri" is derived from the Assamese word "Erai", which means "Castor", as the silkworm feeds on castor plants, has excellent thermal properties and offers tremendous blending possibilities with other natural and synthetic fibres including jute and wool. Around 90% of silk fibre produced in India is of Mulberry variety with largest production in Karnataka, Andhra Pradesh and Tamil Nadu. Muga Silk is unique produced in Assam having a golden sheen and is a prized possession of our country. We were to start trail manufacturing by blending silk fibres with synthetic fibres such as viscose/ acrylic / polyester in our spinning unit at Hubli in Karnataka. I was exploring the possibilities of getting skilled powerloom weavers to make fabric from our supplies of blended silk yarn at a reasonable cost on experimental basis before embarking on commercial scale production.

Roughed Up

Due to the growing demand for silk fabrics, power looms with blended silk yarn can produce blended silk fabrics in large quantities and at a faster pace compared to handloom weaving. However, the finished fabric's quality is typically not as good as that of hand-woven silk fabrics. Thus, while both handloom and power loom weaving techniques are used to weave silk, Handloom Woven Silk is regarded as more luxurious and is more expensive and durable than power-loomed silk.

As a passionate young person with a clear vision to manufacture a different product in our spinning mill, I was on a mission to Raja Ramdin of Akbarpur to find out the most effective ways to implement the trials of getting fabrics woven from mix blend of silk with synthetic yarn. I was about twenty minutes into my walk hoping to cover the distance to Ramdin in another fifteen

minutes that I saw Seven to Eight Villagers briskly marching towards me and abruptly stopped at a distance of some fifty meters. I slowed and again walked normally eager to check from them the exact distance left to reach my destination.... In any case, I felt important to exercise caution and be respectful of others' privacy and personal space when encountering unfamiliar people in isolated places. The more I came near to them I felt uncomfortable and nervous, and perceived the strangers as potentially dangerous and threatening.



Blended synthetic fabrics.

The group of seven instead of going ahead obscured themselves by wrapping their faces with napkin size cloth and encircled me menacingly. In a split of a second the scenario was changed, what should I do now, the suitcase slipped from my hand and hit the ground in the

ground. No one objected but I remained squatted on the ground, numb, dishevelled, praying for relief from torture. A person from far end shouted why did RAJA JI not send someone to rescue you? I had no answer but hearing RAJA JI in the added respect JI to RAMDIN was AMRUT like shield of protection to me. I was now breathing normally waiting for further diktat. I said slowly and confidently that I tried from Kanpur railway station telephone booth but the calls were not getting connected.

Two from the gang were directed by the leader to escort me to Raja Ramdin and the rest hurriedly proceeded ahead on their mission. We stopped outside a triple story structure before I could go ahead and knock the main door some workers were coming out from the side of the building on seeing they gestured me



Eri silk worn in palm.

to wait and went inside, an elderly person of about fifty plus in spotless white kurta pyjama emerges looks directly astonished to see me in shambles gasped KYA VAIDYANTHAN SHAHIB, SAB KHYRIAT: - SIR IS EVERY THING ALRIGHT - He glanced ahead and sideways the said, who directed me to take the route Station Master! I unconsciously without taking their consent started filling the empty suitcase of papers and belonging spilled over on

A Sense Of Relief

Ramdin embraced me and took me inside his residential section of the bungalow. A spacious room was hurriedly made, a large bucket of warm water bath was comforting after miraculous ordeal, I felt rejuvenate and the urge at this juncture was to deal with the mission Akbarpur with Raja Ramdin.

The next two days we took out sample fabrics from his power and hand looms, checked the competence of his weavers and concluded that yarn strength has to be increased to

Observed

how waste and substandard yarns of different counts and blend procured from various sources are skillfully segregated and made into sizable 1 Kg yarn on cones. In case the yarn is weak how it is spliced with better quality yarns. The factory had separate section in the ground floor for mercerization and starch coating.

Note: I was the Marketing Manager of Boruka Textiles (A Unit of Transport Corporation of India) weak Independent Bhoruka Headquarter in Bombay from 1982 to 1989.

Both processes help to create textiles of sustainable quality and hide the impurities of substandard yarns making it ideal for several different applications. I could finalise an understanding with Ramdin that he will make fabric samples from the yarns sent to him for development and post them to us at our Mills SQC laboratory. By end of 1983, we could successfully blend silk with synthetic fibres which reduced the cost of production while retaining the benefits of silk and strength of fabric. We came out initially with 2/40s and 2/60s NM in 48/52 blends of silk and polyester the first number implies the number of plies and the second number represents the count or thickness of yarn. Raja Ramdin was very considerate and helpful more so I am certain deriving a sense of relief following the chilling encounter I had to unfortunately face in his home town on my maiden visit. He was for me a "Large Hearted and the most POWERFUL PERSON IN THE DISTRICT OF AKBARPUR".

The new findings rule out some of the theorized causes of the heart inflammation and suggest potential ways to further reduce the incidence of a still rare side effect of vaccination, the authors say.

Mycocarditis is a generally mild inflammation of heart tissue which can cause scarring but is usually resolved within days. The increased incidence of myocarditis during vaccination was seen primarily in males in their teens or early 20s, who had been vaccinated with mRNA vaccines, which are designed to elicit immune responses specifically to the SARS-CoV2 virus.

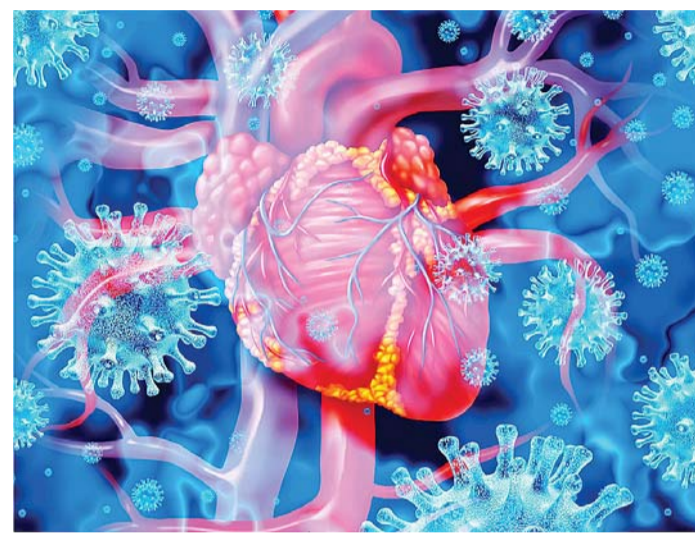
According to the Centres for Disease Control and Prevention (CDC), among males aged 12 to 17, about 22 to 36 per 100,000 experienced myocardiitis within 21 days after receiving a second vaccine dose. Among unvaccinated males in this age group, the incidence of myocardiitis was 50.1 to 64.9 cases per 100,000 after infection with the COVID-19 virus.

For the new study, the

#COVID-19

Rare Heart Inflammation

Heart inflammation was caused by a more generalized response involving immune cells and inflammation.



Researchers have identified the immune signature of rare cases of myocarditis, a heart muscle inflammation, among people who received an mRNA COVID-19 vaccine.

When new COVID-19 vaccines were first administered two years ago, public health officials noted an increase in cases of myocarditis, an inflammation of the heart muscle, particularly among young males who had been vaccinated with mRNA vaccines. It was unclear, however, what exactly was causing this reaction.

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researchers, led by Carrie Lucas, associate professor of immunobiology, Akiko Iwasaki, professor of immunobiology, and Inci Yildirim, associate professor of paediatrics and epidemiology, conducted a detailed analysis of immune system responses in those rare cases of myocarditis among vaccinated individuals.

They found that the heart inflammation was not caused by antibodies created by the vaccine, but rather by a more generalized response involving immune cells and inflammation.



"The immune systems of these individuals get a little too revved up and over-produce cytokine and cellular responses," Lucas says.

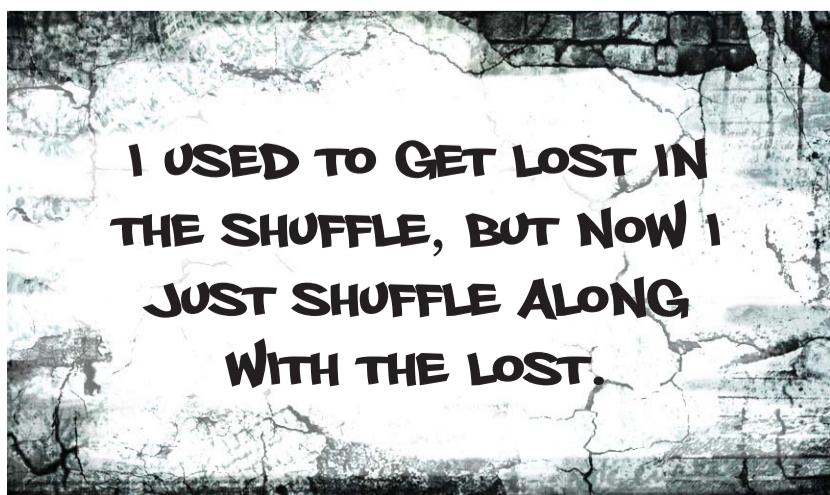
Earlier research had suggested that increasing the time between vaccination shots from four to eight weeks may reduce risk of developing myocardiitis.

Lucas notes that, according to CDC findings, the risk of myocardiitis is significantly greater in unvaccinated individuals who contract the COVID-19 virus than in those who receive vaccines. She emphasizes that vaccination offers the best protection from COVID-19-related disease.



By Jerry Scott & Jim Borgman

THE WALL



BABY BLUES



By Rick Kirkman & Jerry Scott

ZITS

