The secret to pouring a smooth beer? Keep your eye on the vacuum, physicist says

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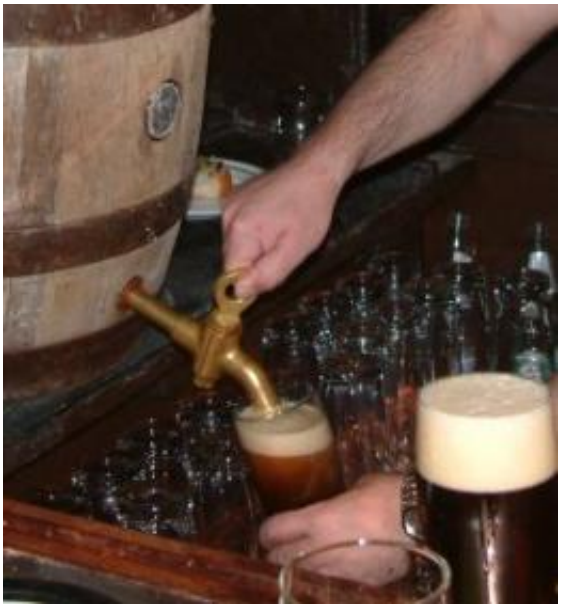

Image: John White

Hong Luo doesn't drink beer himself—he's allergic to alcohol. But Luo, chair of the University at Buffalo's physics department, knows all about the secrets of pouring a smooth brew. That's because it's just basic physics.

"You see so many things in everyday life that seem simple, but if you look at the physics more closely, it's really quite neat," he said. "There's science everywhere."

So as fall gets underway and tailgating parties abound, drink safely and take note: Cans with significantly wider mouths or two holes—which some brands are newly marketing—really do cut down on foam and awkward glugging, Luo says. It's not just an advertising gimmick.

Though most people know this intuitively, they may not be knowledgeable about the science behind why this happens.

Allow Luo to fill you in.

The first concept to understand is atmospheric pressure. In a nutshell, the atmosphere of the Earth—all the air molecules floating around us—exerts a force that pushes on objects.

To demonstrate how this works, Luo sometimes shows his classes a simple experiment: He fills a mug to the brim with water, caps it with a smooth glass plate, holds the pieces tight, flips the whole contraption upside down and lets go. The water will stay in the mug. Why? The pressure that the atmosphere exerts is enough to keep the plate pushed up against the water.

"Atmospheric pressure is quite strong," says Luo, who teaches an undergraduate seminar titled, "Who Needs Physics in the Real World?" "It's enough to hold 10 meters worth of water. You don't feel it because your body is used to the pressure, but it's there."

What does this have to do with drinking beer?

As liquid exits a can, it leaves behind a vacuum—a totally empty space in which you won't find anything, not even air molecules.

"Once you create this vacuum, the atmospheric pressure is going to push air in," Luo says. "It's a dramatic effect: Each time you drink, you create

a small vacuum, and the atmosphere responds by pushing air in." (This is the same, simple principal many modern pumps rely on: They push air out of a space, creating a vacuum that air or water rush to fill.)

A super-wide hole or a second hole placed some distance away from the first enables this pressure equalization to occur without obstructing the beer leaving the can, Luo says.

As such, when it comes to getting an unbubbly pour, today's single-hole, pop-top beer cans may be inferior to old-time counterparts like those seen on the hit show Mad Men, which required revelers to punch a hole on each side of a smooth lid—one for drinking, the other for taking in air. Luo hasn't seen Mad Men (he's more of a fan of the Big Bang Theory, a show that features physicists prominently), but he says the old-fashioned beer cans sound like winners.

One last important question: What would happen if you drank beer in a vacuum?

Nothing much, Luo says. The mini-vacuum drinkers create by sipping on beer would just stay inside the can.

But worries about beer would probably be the least of your concerns in such a situation, Luo adds.

"If you've ever seen the movie Total Recall, Arnold Schwarzenegger dreams he landed on a planet where there was no air, and his eyeballs came out," Luo says. "That may not actually happen, but your body may swell."

"Here on Earth, you don't feel the atmospheric pressure because our bodies have an inside pressure that's the same as the outside," he says. "But when you suddenly put someone in a vacuum, that inside pressure is

still there, but the outside pressure is gone."

Provided by University at Buffalo