

University physicists study urine splash-back and offer best tactics for men (w/ Video)

November 7 2013, by Bob Yirka



(Phys.org) —A team of four physicists at Brigham Young University (calling themselves "wizz-kids") has been studying the physics properties of urine splash-back in a urinal-like environment. Their mission was to



uncover the fluid dynamics involved in male peeing and to hopefully discern which approach leads to the least amount of splash-back (and less mess). They will be presenting their results at the American Physical Society Meeting later this month.

It's a problem males have dealt with since the advent of clothes and porcelain toilets—letting fly at the urinal inevitably results in some splash-back onto the floor, or worse, trousers. To better understand the problem, the team at BYU set up a water tank and nozzles (emitting colored water) to mimic the natural flow of human urine as it leaves the body. They then filmed the action using <u>high-speed cameras</u>. Scrutiny of the video allowed the team to clearly see which sorts of techniques cause the most, or least splash-back. They also set up another tank to mimic sitting on a toilet to pee, rather than standing at a urinal.

In analyzing their results, the researchers found that sitting on a toilet, as most men well know, results in the least amount of splash-back (the contact point is much closer). They also discovered something likely few men have considered—that urine follows what is known as the Plateau-Rayleigh instability—where a pee stream breaks up into drops before striking something else. That's the worst thing that can happen, the team reports, because each drop creates splash-back. To avoid that, men should stand as close to the urinal as possible they advise. Also helpful is directing the stream to hit the back of the urinal at a downward angle. That creates less splash-back and the drops that do bounce, head downwards into the urinal drain. Conversely, to prevent messing one's trousers (or angering neighbors) they suggest men not spray directly into the urinal or into the pool that forms at the bottom of the urinal, both cause a lot of splash-back.

The team also report that they also found that many detergents used to clean urinals tend to make the problem of splash-back worse because it reduces surface tension. Thus dirtier urinals might be less messy.



More information: 1. The presentation, "The Hydrodynamics of Urination: to drip or jet," is at 5:24 p.m. on Sunday, November 24, 2013 in the David L. Lawrence Convention Center Room 333. ABSTRACT: <u>meeting.aps.org/Meeting/DFD13/Event/202555</u>

 The presentation, "Urinal Dynamics," is at 5:11 p.m. on Sunday, November 24, 2013 in the David L. Lawrence Convention Center Room
ABSTRACT: <u>meeting.aps.org/Meeting/DFD13/Event/202554</u>

- 3. <u>splashlab.byu.edu/</u>
- 4. Press release

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