

Bernoulli smoke ring “air cannon”

The correct name for the air cannon, smoke-ring device is “vortex generator”. The “ring” of air that shoots out of the cannon is actually a flat section of air. The outer edge of this moving air is rolling backwards on itself. This vortex of air is generated because the air leaving at the center of the hole is traveling faster than the air leaving around the edge of the hole. The air around the edges takes longer to get out of the can since it is slowed down by friction. The swirling or vortex motion can be observed if a little smoke is in the container before giving the plastic a tap. This activity demonstrates that air occupies space and the rolling smoke rings are an added bonus.

Bernoulli’s principle states that the faster air is moving, the lower its pressure. Since the air inside the vortex is moving faster than the air outside the vortex, the higher inward pressure from the outside air is the force that holds the smoke ring together. Eventually, friction steals away all the energy stored in the vortex and the smoke ring drifts to a stop and vanishes. Very cool!

You can see a demonstration of this at:

<https://www.stevespanglerscience.com/lab/experiments/air-cannon-smoke-ring-vortex-launcher/>

Probably shouldn’t actually shoot it at people though.

Supplies:

- 2 air cannons, different sizes
- smoke machine