

The Gravitational Wave Jug



Ankur Barsode, Ikbal Ahmed

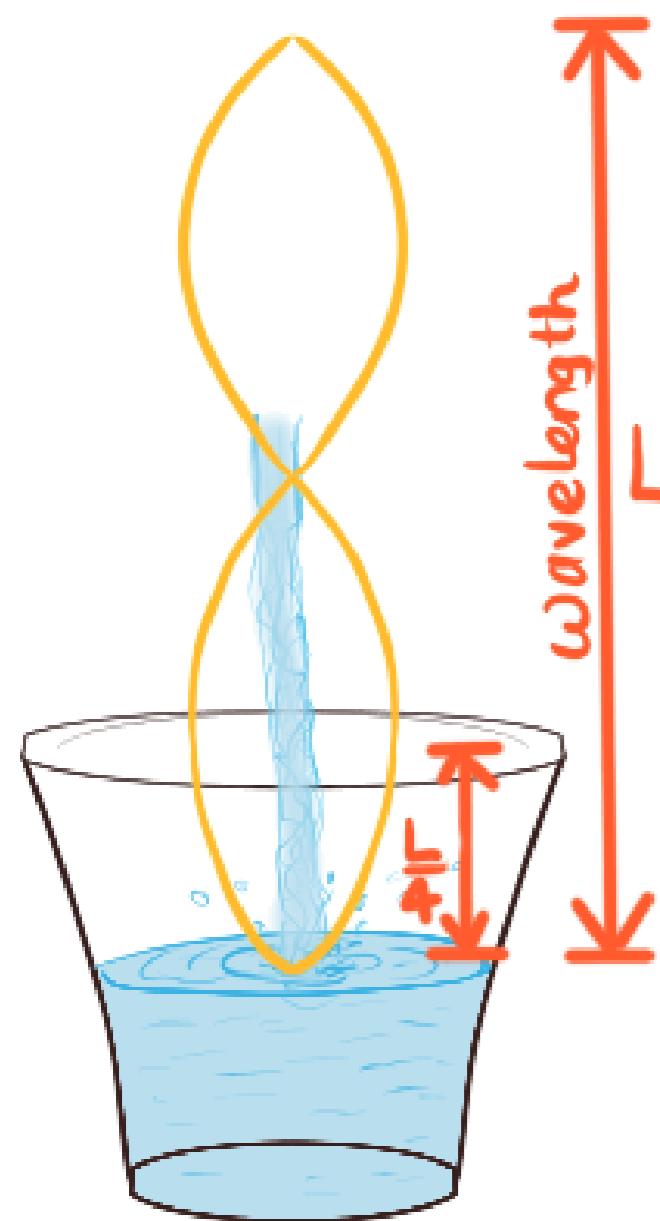
ankur.barsode@icts.res.in



What's common between the following?

The curious sound when you fill a bottle...

All kinds of sounds are generated when water drips into any vessel

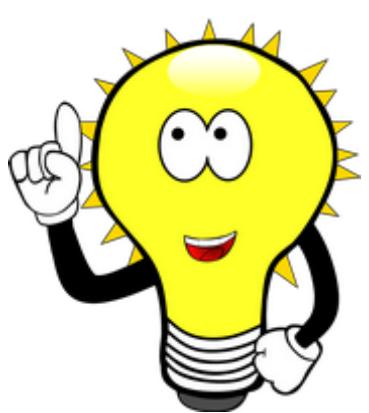


But the loudest sound is the one that resonates with the standing column of air above the water surface

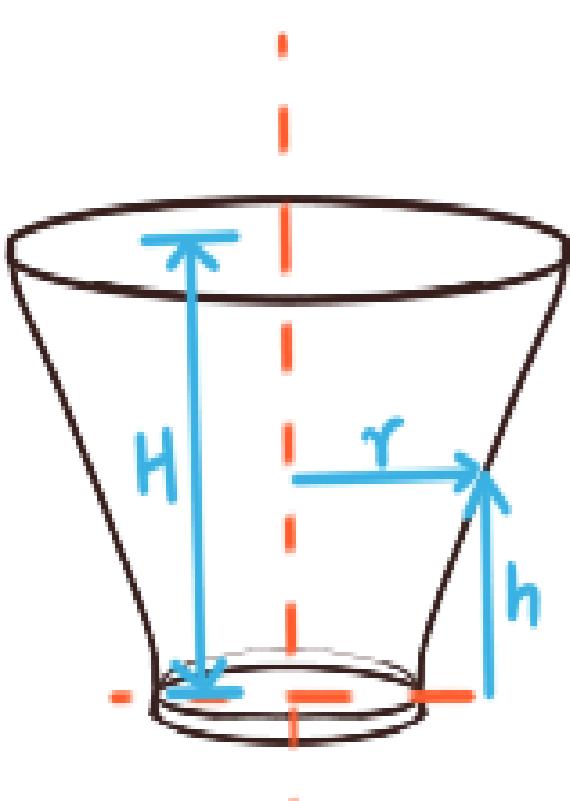
It has a wavelength 4 times the height of the air column

As the vessel fills up

- The height of the air column decreases
- So the wavelength of sound decreases
- frequency $\propto 1 / \text{wavelength}$



The frequency of **sound** increases with time as the bottle gets filled!



The exact behaviour of the frequency with time depends on the shape of the bottle i.e. on radius r vs height h

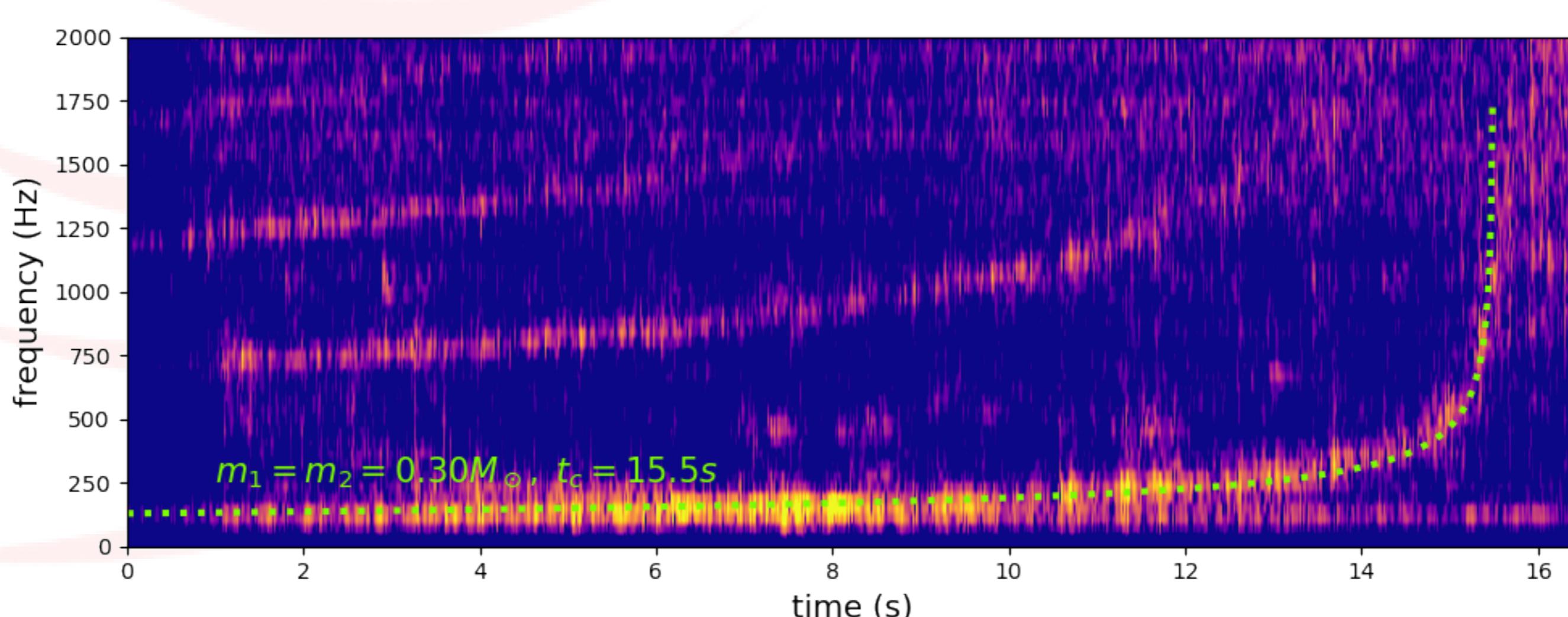
If the bottle's radius goes with height as

$$r \propto (H-h)^{0.9}$$

(a slightly rounded cone, like this one),

the emitted **sound** matches the **gravitational waves** emitted by merging black holes

Scan to hear the sound of the gravitational wave jug!



Scan to hear the sound of the gravitational waves detected by LIGO!

