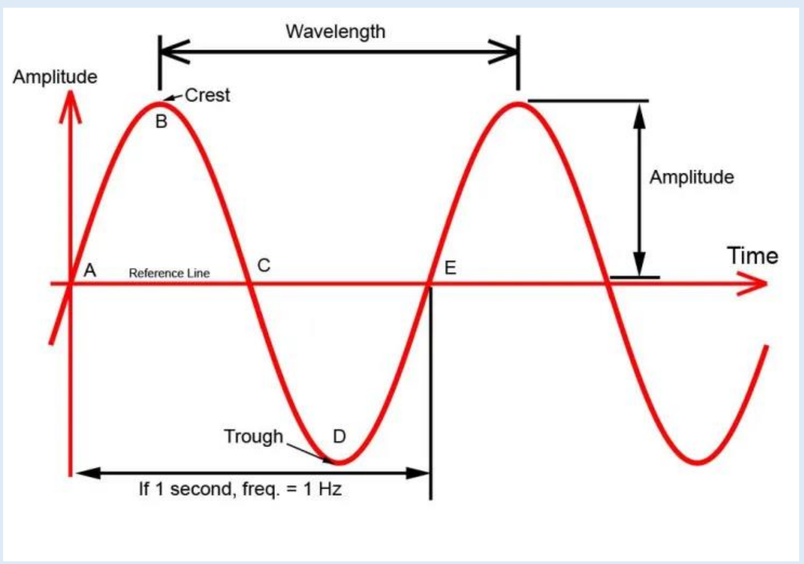
RUBEN'S TUBE
(Flames Dancing to Music)

What is a Sound?

- A vibration that propagates through a medium
- Simplistically, described as sinusoidal waves
- Characterized by wave speed, wave-length and frequency

Wave speed = Wave-length * Frequency



- Sound waves are generated by a sound source, such as the vibrating diaphragm of a speaker.
- *So remember:* ***sound wave requires a medium to propagate and propagate at a particular speed***.
- As the sound wave propagates, molecules vibrate along the direction of propagation of wave, causing local regions of **compression** and **rarefaction**.
- **Compression** - region of high molecular density and pressure
- **Rarefaction** - region of low molecular density and pressure

What is happening inside the tube?

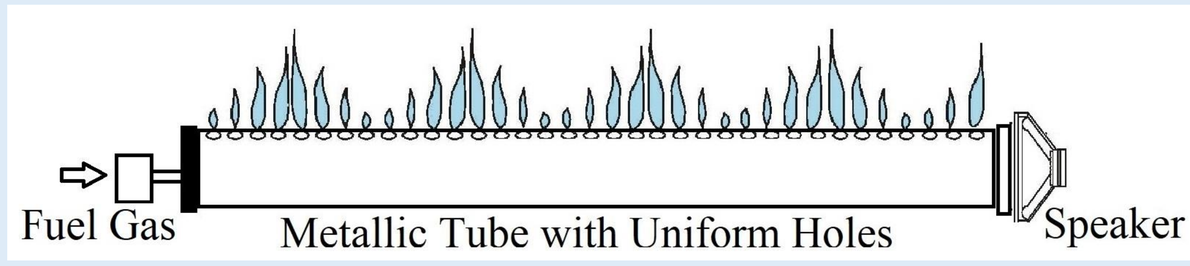
- Sound wave is (induced) generated at one end
- The wave travels through the length of the tube, and is reflected back from the other end.
- The induced wave and the reflected wave interfere and lead to a **Standing wave**

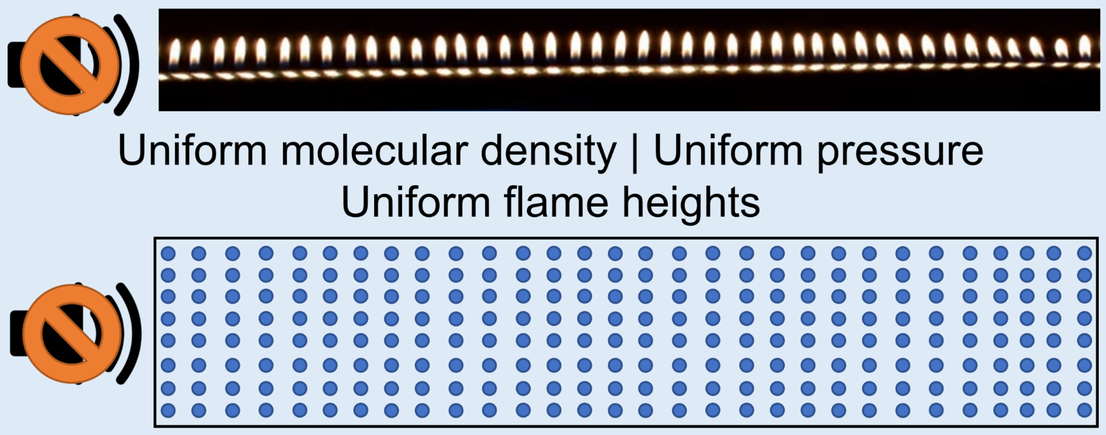
What is a RUBEN'S TUBE?

Ruben's tube demonstrates the interaction between flame and sound waves (music). We will see flame that will dance to a music.

Observe we have:

- A metal tube with holes evenly spaced at the top
- Fuel pumped into the tube and then lit
- Sound is then played into the tube
- Differences in gas pressure caused by the sound create different heights of flame (high at high pressure) (Why?)
- This allows the **visualization of sound waves inside the tube**





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