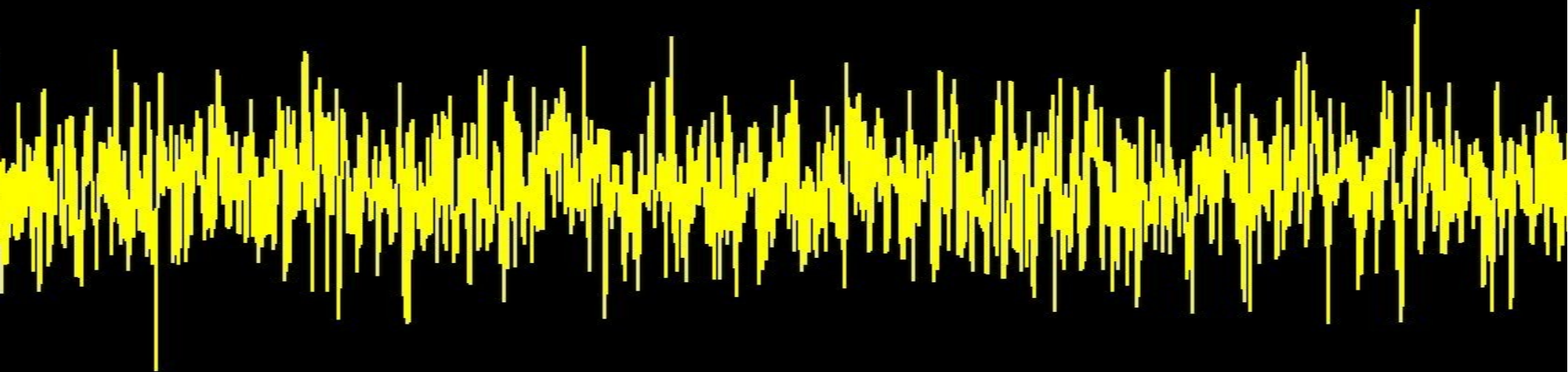


A sound curation in musical instrument conservation



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Universitas Gadjah Mada, University of Melbourne, Monash University

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4 - 7 February 2019 || Arts West Building, Melbourne, Australia

**Faculty of Engineering
Universitas Gadjah Mada
Indonesia**



**The Grimwade Centre
for Cultural Materials Conservation
Faculty of Arts
The University of Melbourne**



**The Music Archive of Monash University
Faculty of Arts
Monash University**



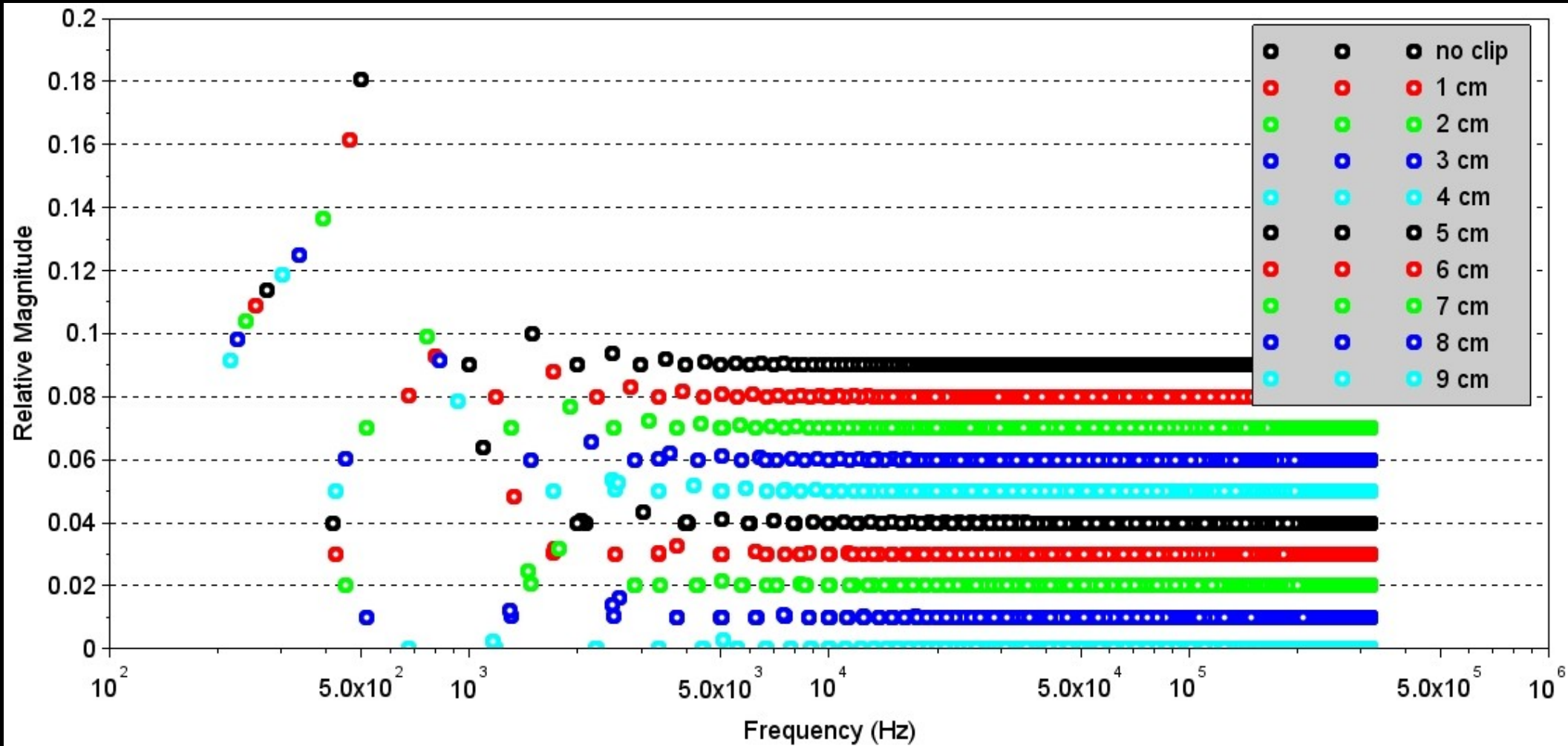
Our collaboration began with the **bundengan**.



Sound characterization of the **bundengan**.



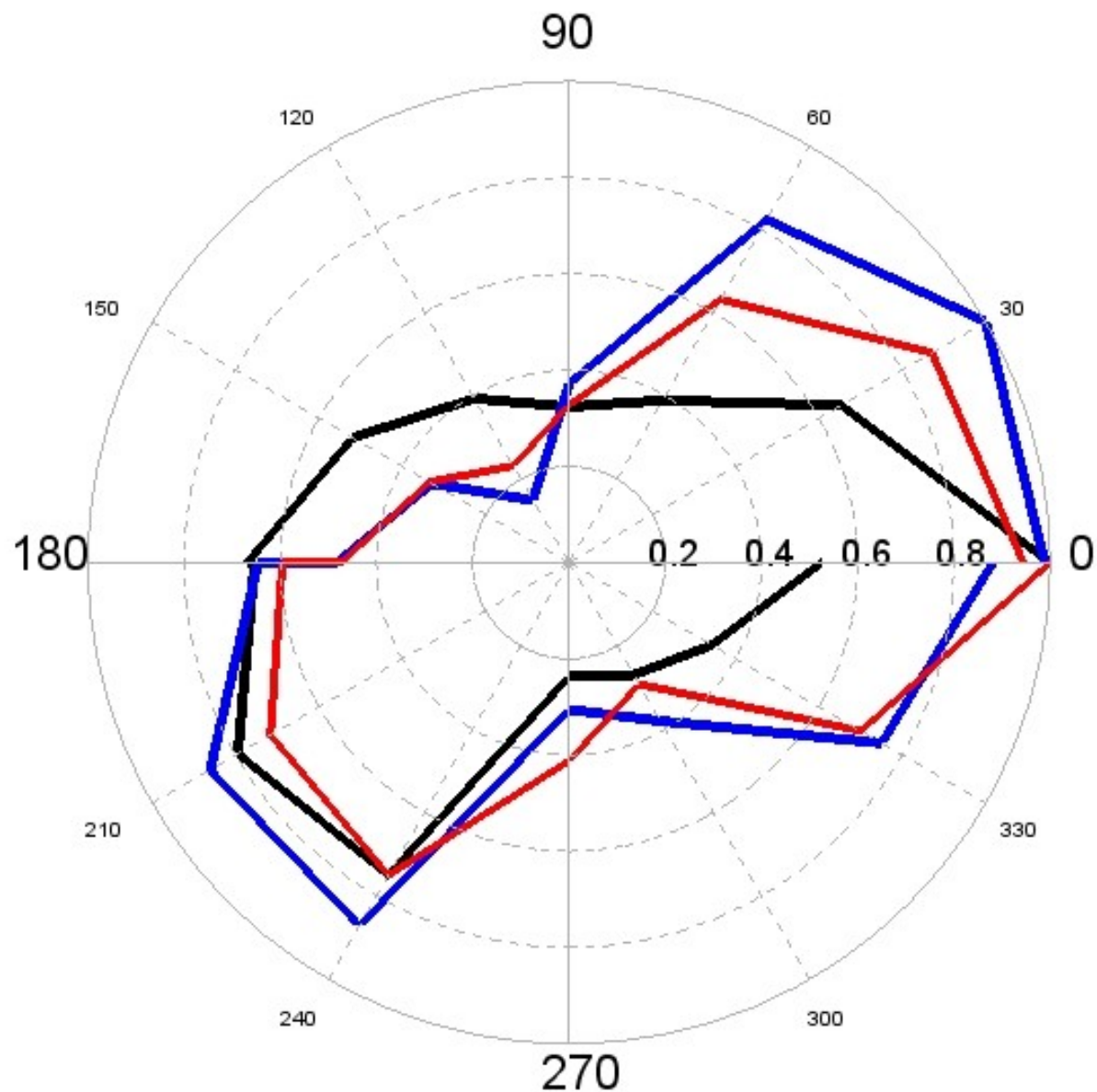
Sound characterization of the bundengan.



Sound characterization of the **bundengan**.



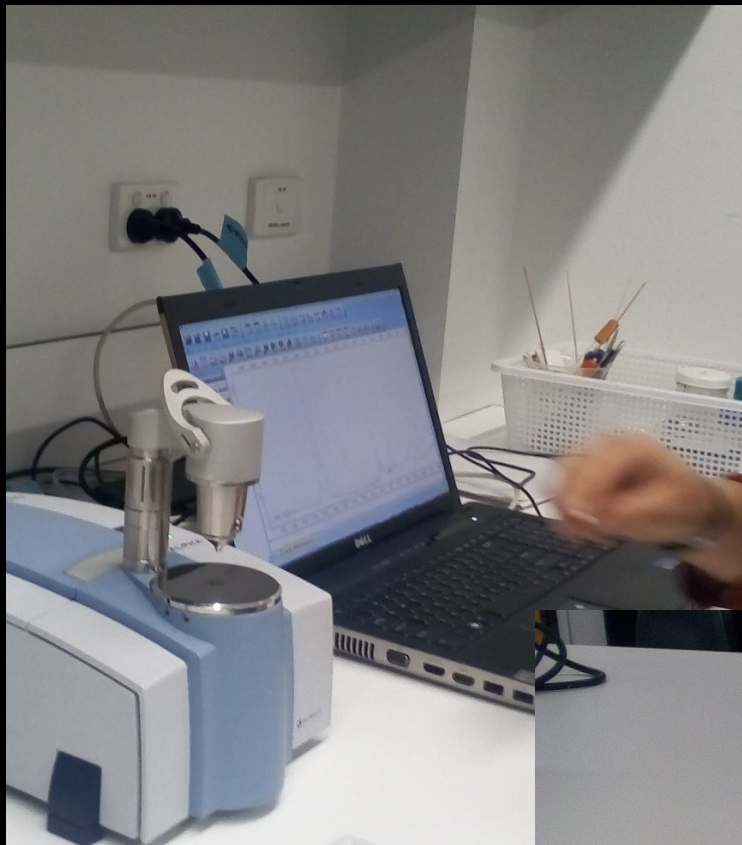
Sound characterization of the **bundengan**.



Next: other instruments also needs to be **conserved**.

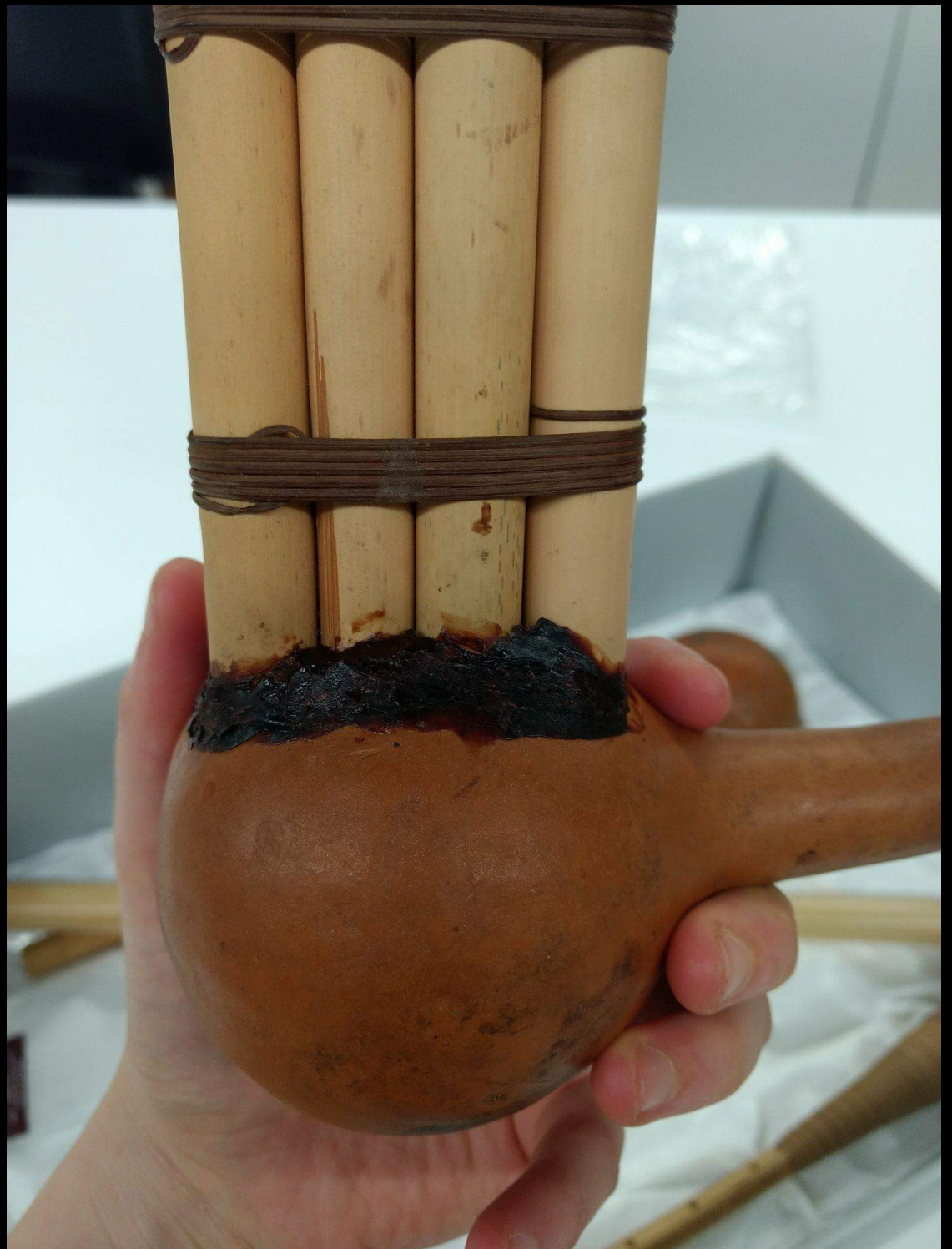


Repair needs to be done with the correct materials and coloring.



This one, called **sompoton**, has been repaired...

But would it still generate the correct **sound**?



This one, called **sompoton**, has been repaired...

But would it still generate the correct **sound**?

We cannot play it because it is too **fragile**.

How can we know their sound... **without playing** them?



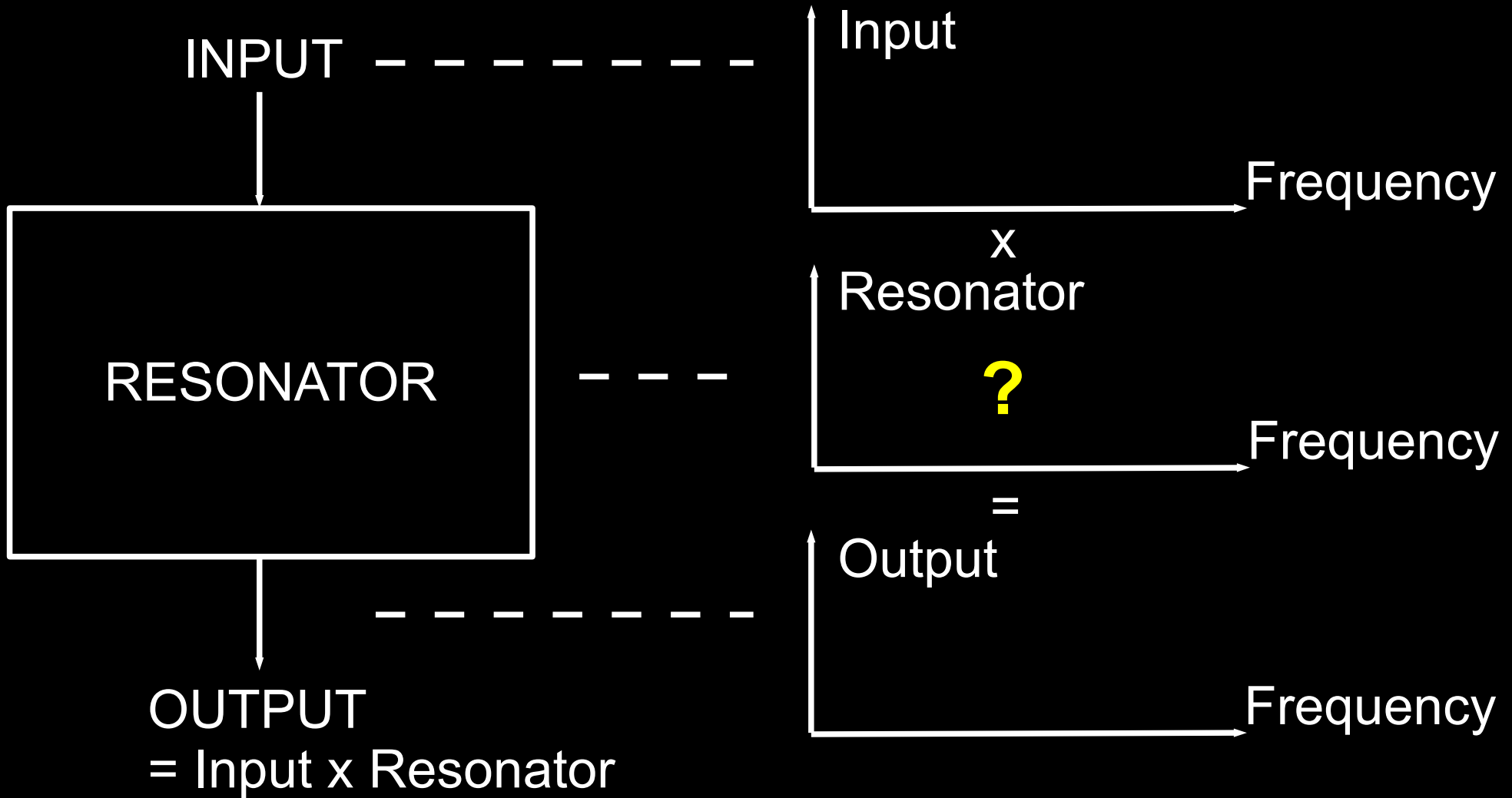
Here is an idea...

All musical instruments are acoustical resonators, with their own **natural frequencies**.

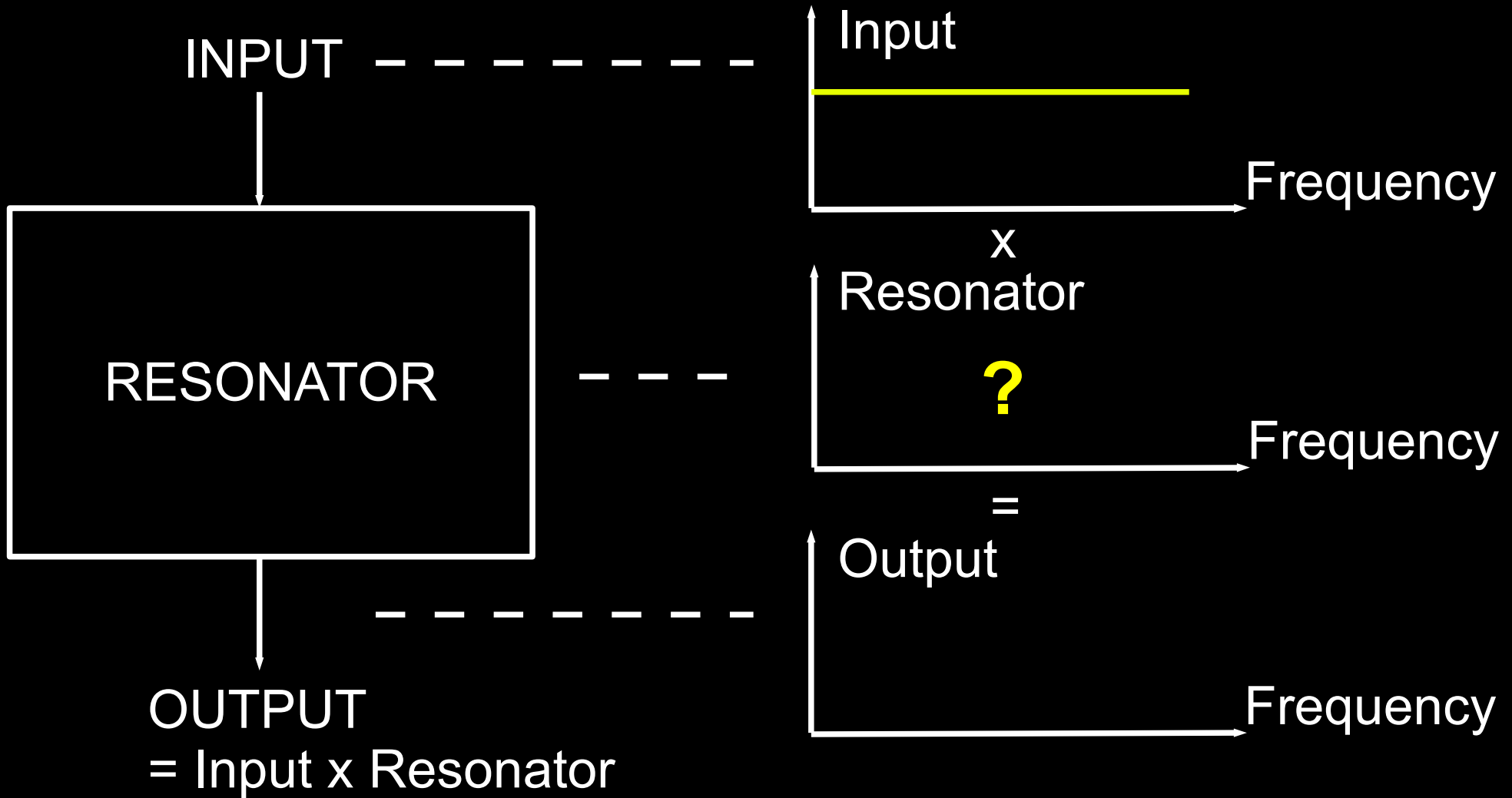
We can feed various frequencies and detect which frequencies **resonates** with that instrument.



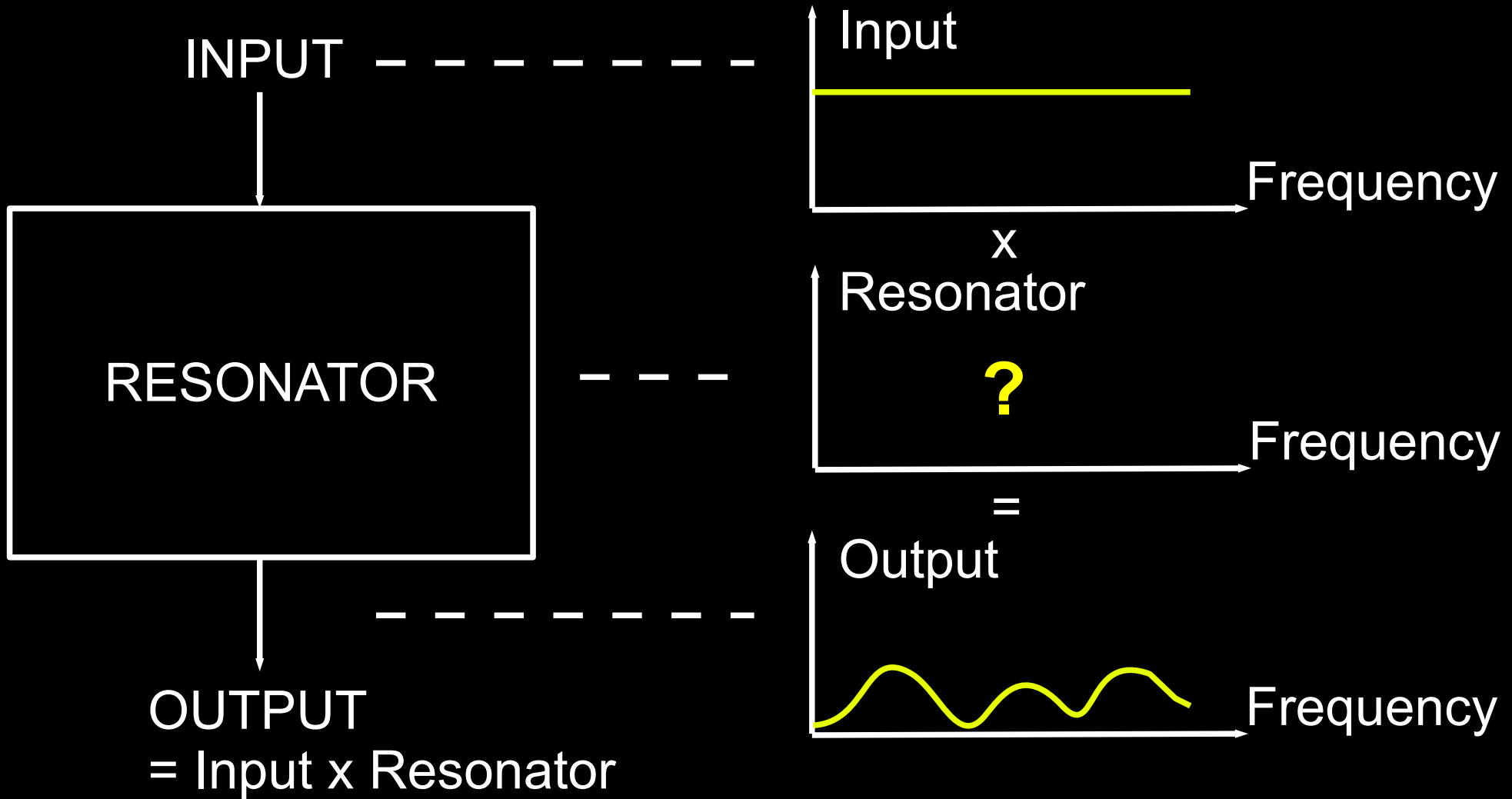
How it works:



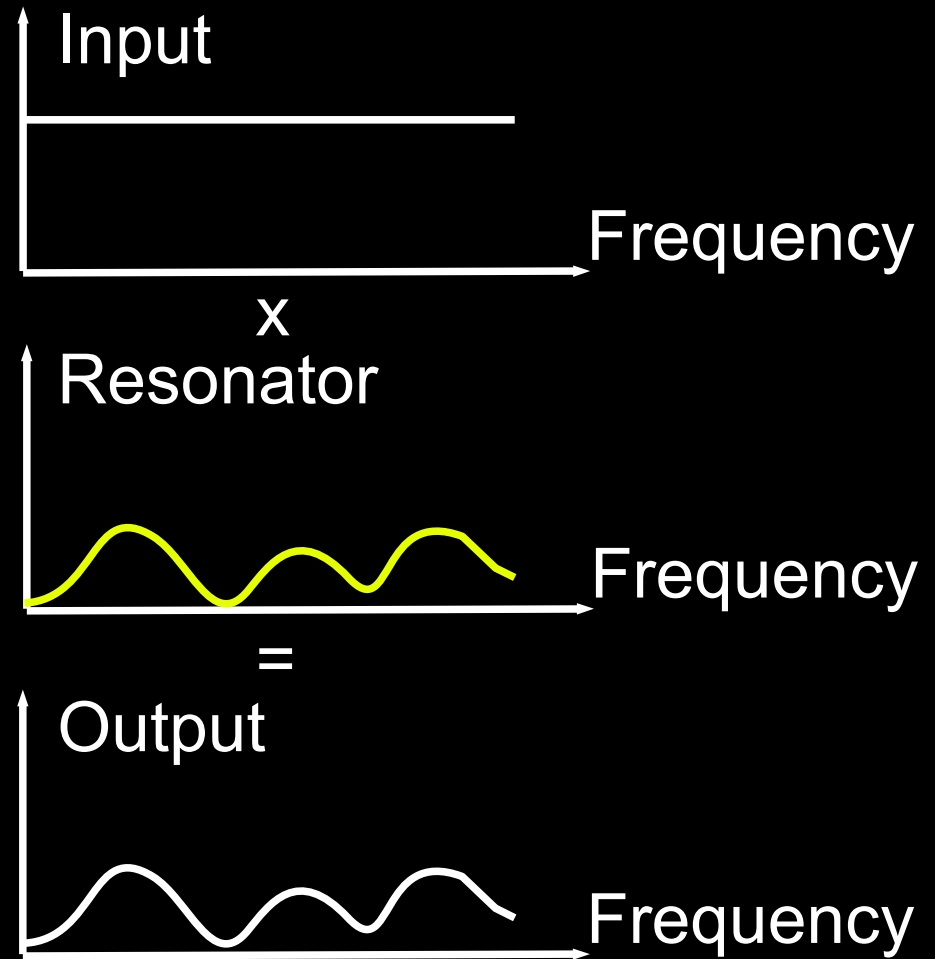
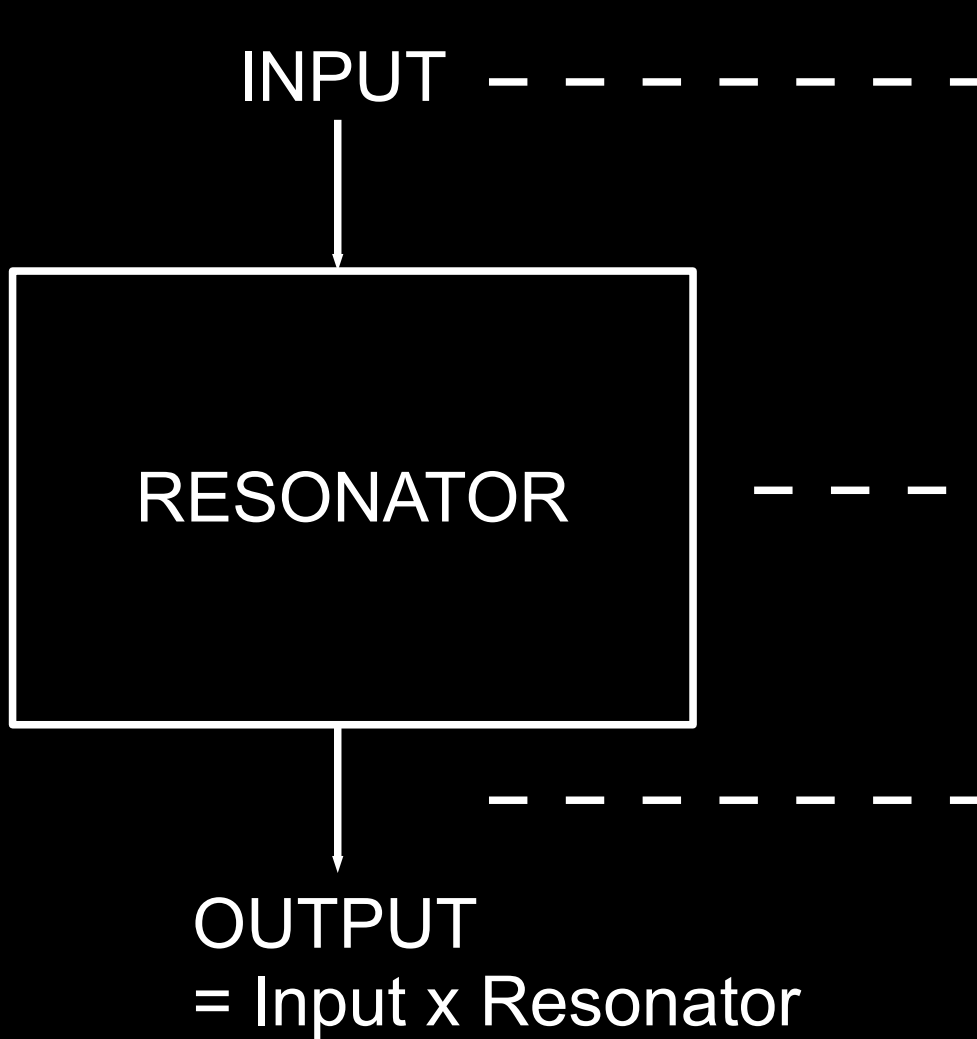
How it works:



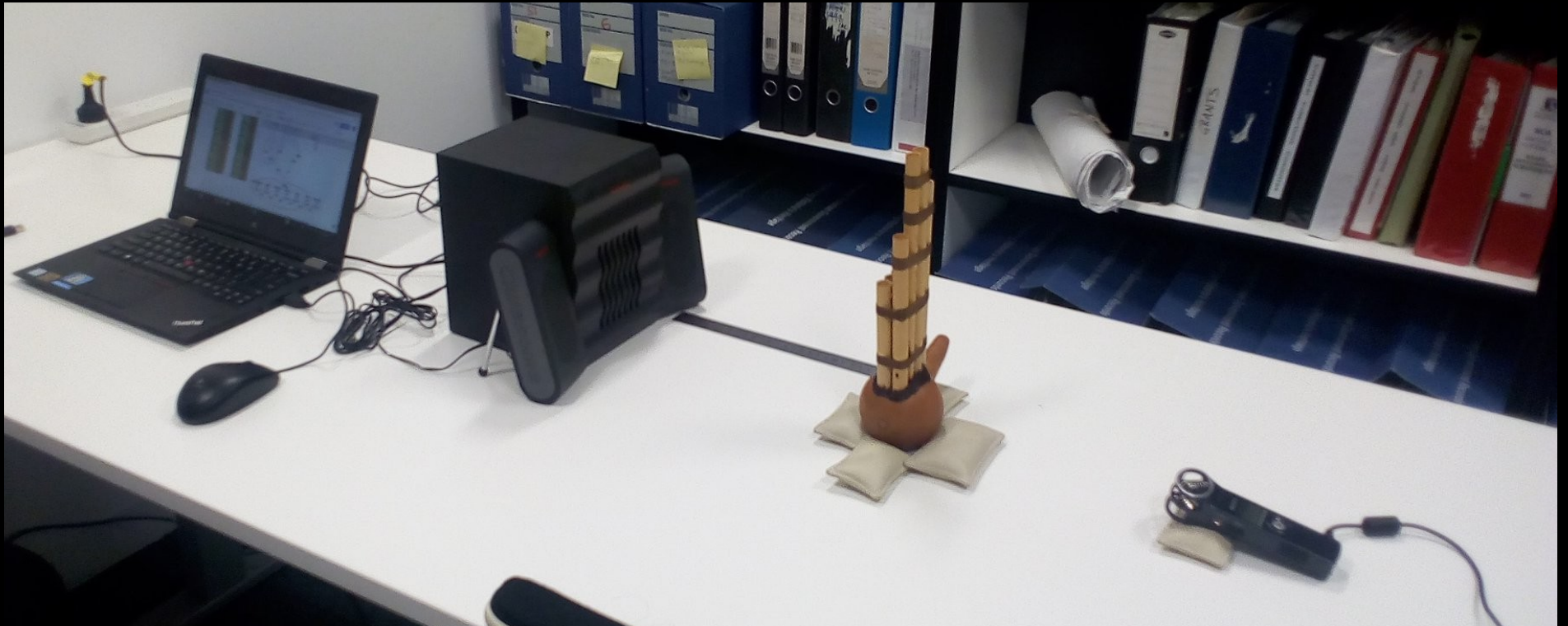
How it works:



How it works:



Experimental setup



Laptop

Speaker

Resonator

Recorder

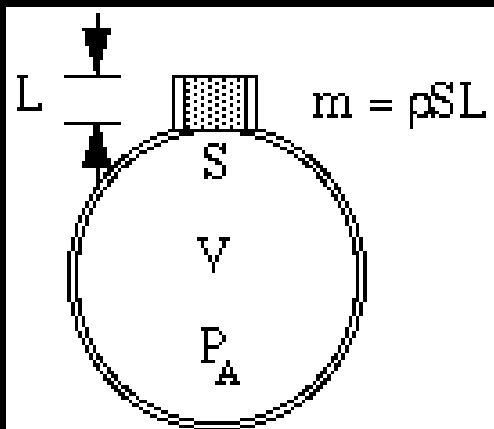
Validation:

We used a '**Helmholtz resonator**' to test our method.

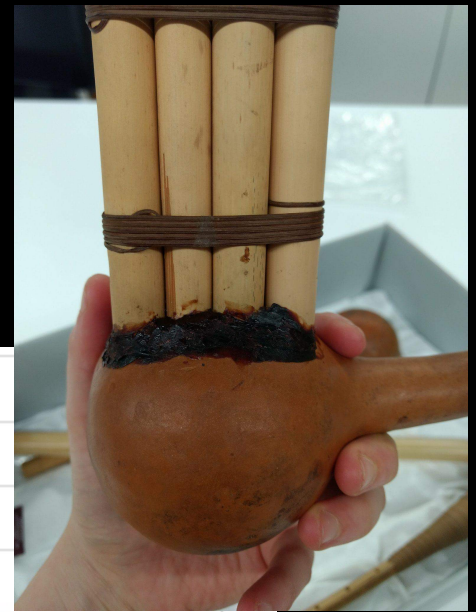
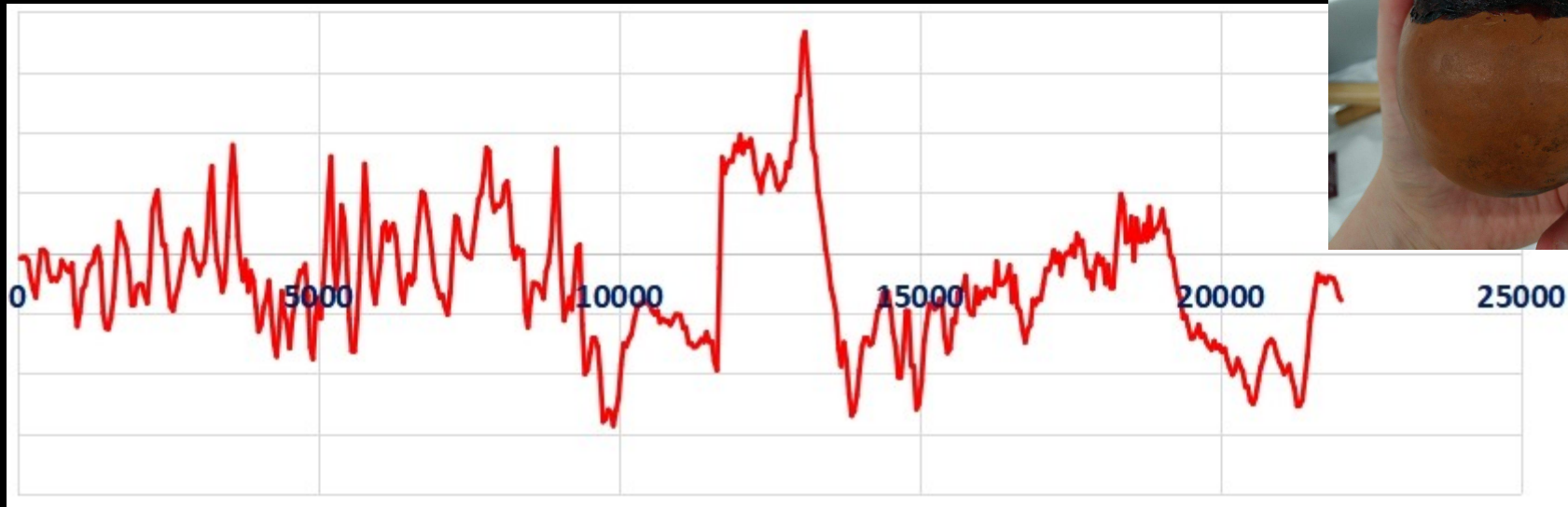
Measurement: 430 Hz +/- 40 Hz

Calculation: 408 Hz

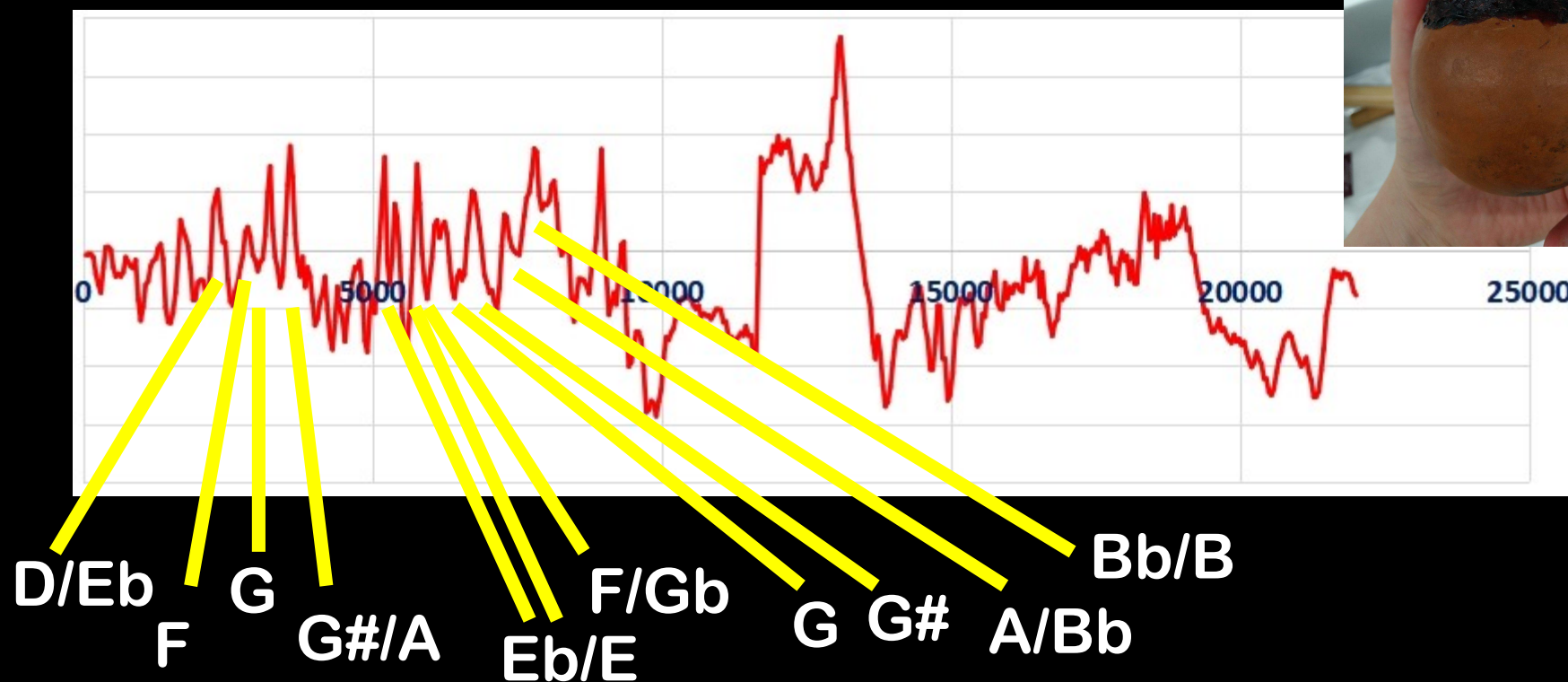
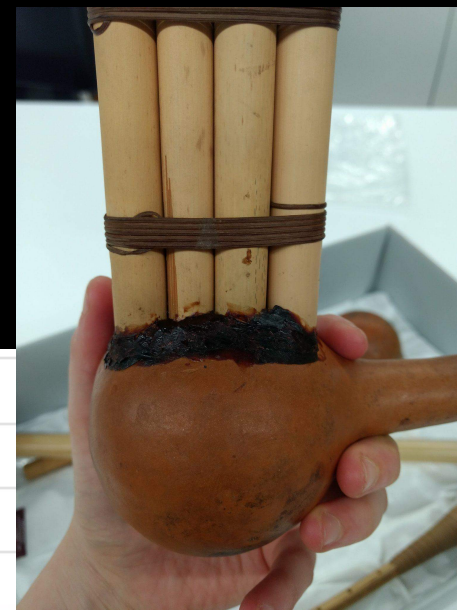
$$f = \frac{c}{2\pi} \sqrt{\frac{S}{VL}}$$



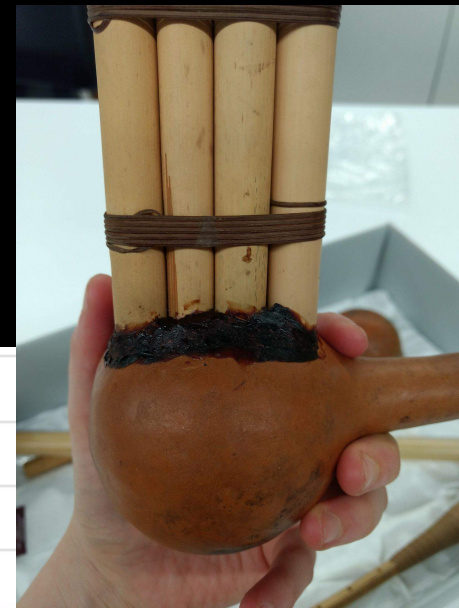
Experimental result



Experimental result



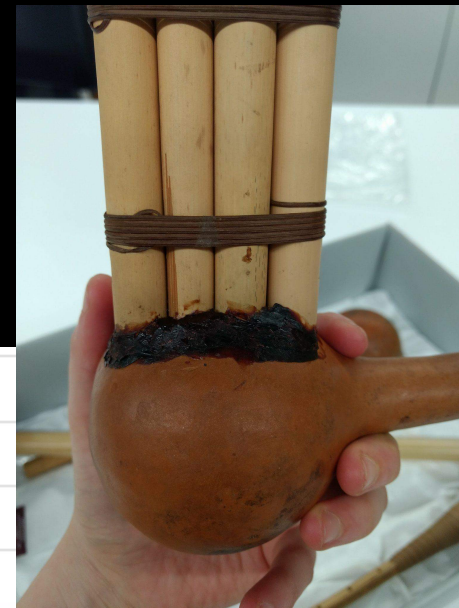
Experimental result



D/Eb F G G#/A Eb/E F/Gb G G# A/Bb Bb/B

Pélog						
<i>panunggul</i>	<i>gulu</i>	<i>dhadha</i>	<i>pélog</i>	<i>lima</i>	<i>nem</i>	<i>barang</i>
(1)	(2)	(3)	(4)	(5)	(6)	(7)
D ₃ -26	Eb ₃ -10	F ₃ -45	G ₃ +24	G# ₃ +43	A ₃ +43	B ₃ +35
	116	165	269	119	100	192

Experimental result



D/Eb

F

G

G#/A

Eb/E

F/Gb

G

G#

A/Bb

Bb/B

Pélog						
<i>panunggul</i>	<i>gulu</i>	<i>dhadha</i>	<i>pélog</i>	<i>lima</i>	<i>nem</i>	<i>barang</i>
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With this method, we can
listen to the instruments
without playing them



With this method, we can listen to the instruments without playing them



- New **digital** data
- Better (?) **curation** of musical instruments
- New **challenges**

Thank You

